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MAY 1928

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Organized to Stimulate Public Interest in Every Phase of Nature and the Out-of-Doors, and Devoted to the Practical Conservation of the Great Natural Resources of America

The American Nature Association seeks to find for Nature Study an essential place in every School and in every American Home. It is working for Forest and Wild Life Protection along sane, economic lines. It believes that clean, healthful Out-of-Door Recreation is the key to Good Citizenship

WHAT ARE Outdoor Good Manners? Mrs. Francis E. Whitley of the General Federation of Women's Clubs has defined them in a card that is being widely distributed by her committee of the Federation. She says:

"To leave the woods and parks as beautiful as you find them; that is *outdoor good manners.*

"Help preserve the wild flowers and trees.

"Always leave a clean camp and a dead fire.

"Help to keep your country 'America the beautiful'".

These are not difficult dictates to observe. Just how much they are becoming a part of the outdoor manners of Americans we will have another chance to see this year. The educational campaigns that have been carried on should have begun to take effect. The American Nature Association's campaign of last year was successful and widespread. It is being carried forward this year with equal activity.

Rapidly the outdoor-going public is resenting the unsightly roadside stand, the ill-placed billboard and other thoughtless desecrations that we see by the roadside.

We were interested to receive recently from one of our members, Mr. H. N. Bartlett of Pittsburgh, a hearty word of encouragement in our outdoor beautification campaign. He says, incidentally, "To me billboards of any description have an antagonizing effect and for years I have purchased substitutes for the commodities so advertised or picked a firm less conspicuous whenever possible". A remarkably effective way of vitiating the selling value of a billboard advertisement. Mr. Bartlett is by no means alone, and as the public grows to resent the obnoxious billboard in just the same proportion is its effectiveness diminished.

In Maine an active campaign for a regulatory law is on under the auspices of the Maine Committee for Restriction of Outdoor Advertising. Florence A. Paul writes that petitions are being circulated widely seeking legislation to this end, either through act of the Legislature or by referendum to the voters. Maine can ill afford to barter its beautiful scenery and the leading citizens of the state realize this.

* * *

More than one thousand members have obtained Cardinal pictures.

WHAT MAKES WILD FLOWERS WILD

A prize cartoon in the Nature Magazine, Outdoor Good Manners Cartoon Contest

OH MA! WILD FLOWERS!!
BRING TH' BASKETS GEORGE! THERE'S SCADS!!!
COME ON JIM! BETCHA I C'N PICK MORE'N YOU!
WAIT NOW - YOU GOT A HEAD START -
RUN FOR YOUR LIVES! THEY'RE COMIN' OVER TH' TOP!!
WILLIAM FERGUSON

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lara Butt. Clear salmon-pink, finest pink	.50	3.00
ream. Beautiful shade of lilac. Gigantic size	.60	4.00
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ictoire D'Oliviere. Red; exceptionally fine tulip in the garden	.70	5.00
Inglescombe Yellow. Clear golden yellow. In reality a Cottage	$.50	$3.00
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Ornatus (*Poeticas*) Snow white perianth, red eye. Early	1.35	10.00
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Please send me free picture folder about the "Indian-detour" and "Harveycar Motor Cruises."

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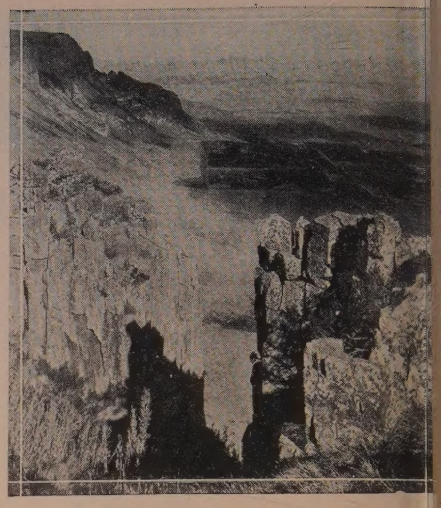
Readers of this column are urged to write to the Travel Editor for any information desired relative to travel, whether it is for short distances or long distances. To every inquirer will be sent, by return mail, some definite information and this will be followed by special literature regarding the places about which they desire information. This department is designed to be of direct personal service to the readers of this magazine.

Within the last few years the Student and Special Tours to Europe have been highly developed to meet the demands of those who wish to travel on a limited income. They have now arrived at a basis which puts a trip to England and the Continent within the reach of almost any ambitious American. The steamship accommodations,—usually Tourist Third Class,—are pleasant and comfortable, and the land travel is by train and under the supervision of competent guides. We have received new literature concerning these All-Expense trips, and early registration is advised.

For those who enjoy shorter boat trips there are many from which to choose. Several lines traverse the Great Lakes and the St. Lawrence, with stops at Montreal, Quebec, and other places of historical and scenic interest. On the Western Coast the Inside Passage from Seattle (or Vancouver) to Skagway, Alaska, is one of the loveliest in the world. Up the coast of British Columbia, with its fiords and inlets so like those of Norway, the snow-capped mountains rising from the green water, and few towns to mar the natural beauty, the traveller can readily imagine he is sailing the same passage with Captain Vancouver himself.

Many people spend all their vacations in Canada. This country has a strong appeal in that it offers all kinds of sports, and all types of scenery. The Canadian Pacific presents literature covering the whole of Canada from the more civilized Eastern section and quaint Nova Scotia, to the wild Canadian Rockies and the world-famous Banff and Lake Louise. The same company has also two fleets of ocean liners sailing the Pacific and the Atlantic. On the latter they offer attractive Summer and Collegiate Tours at extremely reasonable rates.

Minnesota—the Land of Ten Thousand Lakes—is yearly becoming better known throughout the Middle West as a summer resort. Superior and Minnesota National Forests contain some of the finest virgin pine in the country, and with their winding waterways, make ideal spots for canoe trips. Beside these there are Itasca and sixteen



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Here you will experi ence pleasures and thrill that will cheer your hear and remain ever a delight in your mem ory. South Africa is a veritable treas ure house of fascinating wonders—a Pandora Box from which your hand will draw out, every moment, some new and wonderful happiness,—a con tinuous round of charms which neve pall or cloy.

South Africa is a land of invigor ating climate, where life is full of song and pleasure. Here modern civilization moves cheek by jowl alongside of pic turesque, quaint, dignified native Kraal life.

You will find many things you have never seen and can only find in this ancient land famous for its legendary history:

Great Diamond Mines
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The Magic Congo Caves
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SOUTH AFRICAN TRAVEL BUREAU

5 Broadway, New York City

3-4-28

other state parks for the tourist to investigate. The roads are in good condition as a whole, and free camp sites are found on the majority of lakes. Hunting and fishing camps on the smaller and more remote lakes lure many, while summer resorts and hotels offer a gayer atmosphere to suit the desires of the traveller.

Thos. Cook & Son have issued literature describing what is termed a "Vacation Cruise". This is a trip from New York to Europe and the Mediterranean, lasting from the early part of July until the end of August. The members of the cruise live on board the ship, but have two and three day stop-overs at such places as Gibraltar, Malaga, Naples and Egypt. The cost of the cruise is about equal to that of an ordinary European tour, and the places visited are unusual and interesting, combining the Orient and the Occident.

During the latter part of June the National Conference on State Parks will be held at San Francisco. All delegates appointed to attend this conference are being offered low round-trip rates to the Pacific Coast by the western railroads.

The qualifications of Maine for a summer playground have for many years been recognized and appreciated. The boating and bathing and fishing along the rugged coast are excellent, and many attractive summer resorts have been established. Further back in the hills and mountains of the state, one finds all the requisites of good camping grounds. Chains of little lakes encourage canoe trips, while good roads encourage motor trips. Maine is only an over-night trip from New York, and splendid special train service in the summer facilitates frequent trips to and from the city.

An increasingly popular cruise is being conducted from New York to Europe via Norway, Sweden, Denmark and Germany. It is also possible to take a similar trip starting in England, and after visiting the northern countries to proceed further south on the continent. However, for a stranger there is enough of interest in the Scandinavian peninsula to occupy an entire summer. This can be done by arranging leisurely stop-overs in the capitals and metropolises of the various countries, and planning conducted side trips to points off the main line of travel. We have received from the Scandinavian Travel Bureau literature descriptive of such trips, and their approximate cost, which will be sent to you at your request.

Those readers who followed the stories of the Nature Magazine Expedition in Glacier National Park will be interested to know that the park season will open the middle of June. We have had word from the railroads serving this section that round-trip excursion tickets will be obtainable during the summer season. These tickets have done a great deal in popularizing trans-continental trips, and reservations should be made well in advance.

"Most marvelous of sights to man"

The Grand Canyon

Season June 1 to October 1

This matchless view of the grandest of earth's gorges was sketched from the splendid new Union Pacific Grand Canyon Lodge, on the brink of the lofty North Rim, Grand Canyon National Park.

See this mighty chasm 220 miles in winding length, a mile deep, and 13 miles wide, through which the rampaging Colorado River has ploughed the inner granite gorge, flanked by gigantic towers and temples gloriously colored from the palettes of the gods.

This awe-inspiring abyss is but one attraction on the Union Pacific Utah-Arizona tour, which includes also

Zion National Park
Cedar Breaks
Bryce Canyon
Kaibab National Forest

Huge mountains, deep canyons, rosy red and marble white. Vast fairy cities of stone, amazingly realistic — glowing with ever-changing colors. Colorful deserts, ancient ruins, beautiful forests alive with deer, cliff dwellings, wild horses. It's America's greatest scenic combination tour.

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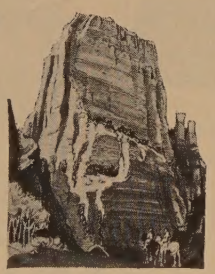
The Great White Throne in Zion National Park



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Union Pacific System, Omaha, Neb.

Please send me complete information including cost, and booklet.

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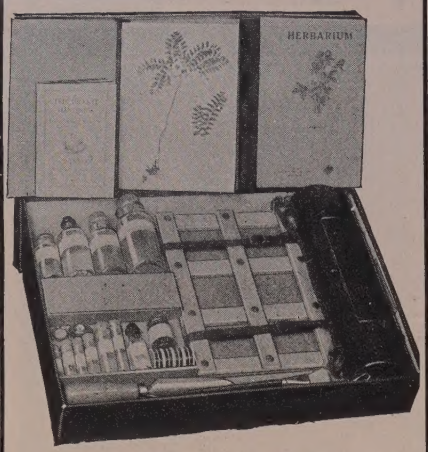

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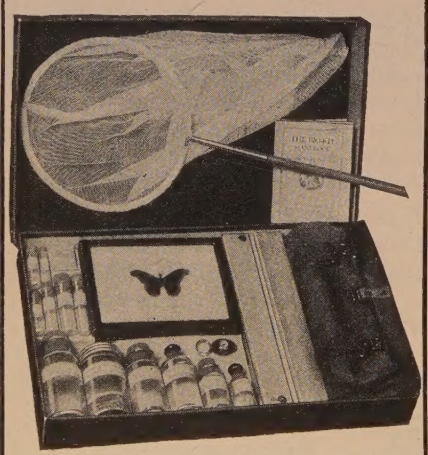

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Hikers—Attention!

The Smoky Mountains of Tennessee, oldest geological formations in the United States, and soon to become the center of a National Park, are to be the scene of some forty-six "hikes" of varying length, conducted under the auspices of the Smoky Mountains Hiking Club, Box 804, Knoxville, Tennessee. James E. Thompson, president, extends an invitation to all climbing organizations in the country to join on these excursions. As many of the trips as possible will be taken near the full of the moon, and "switch-key" and night hikes will be features. The Club also plans as part of this year's work to open up a trail in the Smokies to be part of the Appalachian Long Trail, from Georgia to Maine.

1932 Winter Olympics

An invitation has been extended to Major-General Douglas MacArthur, U.S.A., president of the American Olympic Committee, by the commissioners of Harriman State Park, New York, to consider the possibilities of Bear Mountain and its park environs for the scene of the 1932 Winter Olympics. The commissioners point out in their invitation that good ice conditions prevail during the winter months, and that facilities for bob-sledding, skiing, and tobogganing are adequate. Bear Mountain is but one hour from New York, and is accessible from all parts of the East.

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Permanganate in the Dark Room

There are many photographers, especially among the amateurs who do not realize how adaptable permanganate of potash is to the need of the general worker. It may be used for a great variety of purposes and for all of them it is most useful.

As a reducer of overdeveloped negatives, where an even reduction is required over the entire plate, it is most excellent. A strong solution for rapidly reducing the most dense negative to the best printing quality is: Potassium Permanganate (5% solution) 2 drs.; Sulphuric Acid (10% solution) 5 drs.; Water 10 oz. With the solution used full strength the action is very quick and it should be used only on negatives that are extremely dense and without very great contrast. If the solution is further diluted by the addition of water a slower, and very even, reduction may be obtained.

As a remover of stains, especially those caused by the use of pyro developer, which are bound to occur now and again even with the most careful worker, it is indispensable. The following method for its use in this connection is one of the best: Soak the negative for ten minutes, with constant rocking, in a solution of Permanganate 50 grs.; Common Salt ¼ oz.; Acetic Acid (glacial) 1 oz.; Water 20 ozs. Rinse for a few minutes in clear water and soak in Potassium metabisulphite 1 oz., Water 20 ozs. until the bleached image is white clear through to the back of the film. Then redevelop the negative in any non-staining developer such as metol, amidol, elon, etc. until a good, neutral black image, with clear shadows, is produced.

As a bleacher for paper before sulphide toning it is unequaled. It has the power of clearing up the high lights and the result, on a correctly developed print, is a pleasing cool brown quite free from any trace of yellow. Into one ounce of a 10% solution of Hydrochloric Acid put thirty drops of a 5% solution of Permanganate of Potash. Place the print in this bath until the image is completely bleached out. Transfer directly to a bath composed of 2 grains of Sulphide of Soda to the ounce and allowed to remain until the image has fully reappeared. Should any brown stains occur, and this rarely happens, they may be readily removed by immersion in a 1% bath of Potassium Metabisulphite.

How can film be cleaned from hardened negatives.—F. B. G.

Of course the film can always be scrubbed off with a stiff brush and hot water but this is likely to result in scratching the glass. The following is a better way: Make a solution of one ounce of Bichromate of Potash in twelve ounces of water. Into this solution pour very slowly, in order to keep it from boiling over, one ounce of sulphuric acid. Allow the plate to soak in this

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Kampkook is the all purpose, all weather camp stove; equally efficient and satisfactory for preparing picnic lunches or big camp meals for healthy, out-o'door appetites.

Within its sturdy steel case are many patented features, the result of years of practical experience, which enable Kampkook to render constant and unfailing service under all conditions and which are found in no other camp stove.

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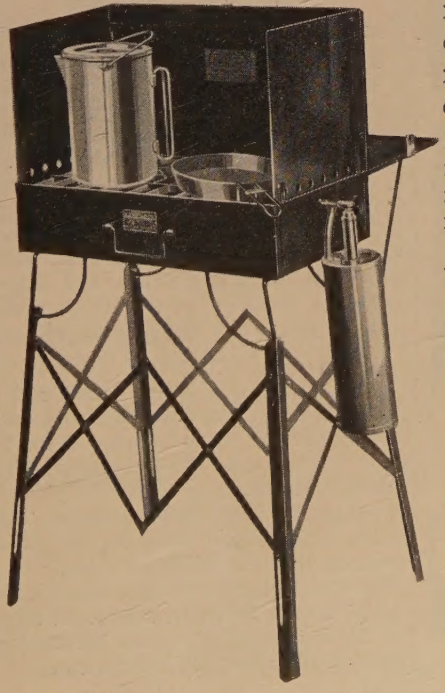

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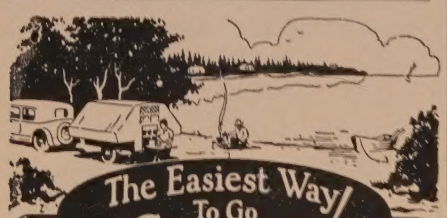
A hint to campers

HERE'S a big little item to put up near the top of every camper's list—that all-important flashlight. Man alive, don't leave without *that!* At the click of the switch, there's a handful of daylight to show you the way, to find things, to cheer up a dark tent, to read by, to . . . you can think of a hundred more ways to use it.

And be positive about the batteries inside. Make it a point to have genuine Eveready Batteries. If your flashlight's Eveready inside and out, you'll know it deserves its name.

Every seasoned camper has the flashlight habit.



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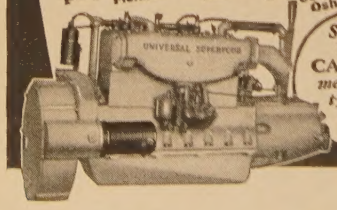

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until the film becomes thoroughly softened when it can be washed off and the glass polished with a soft cloth. One should never use this bath with bare fingers as it burns. Either wear rubber finger tips or hold the plate, when removing from the bath, with a wooden clip. This is an excellent method for thoroughly cleaning old lantern slides to use as cover glasses.

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Howard H. Cleaves

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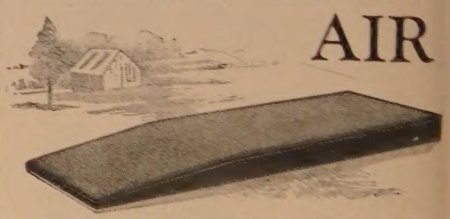

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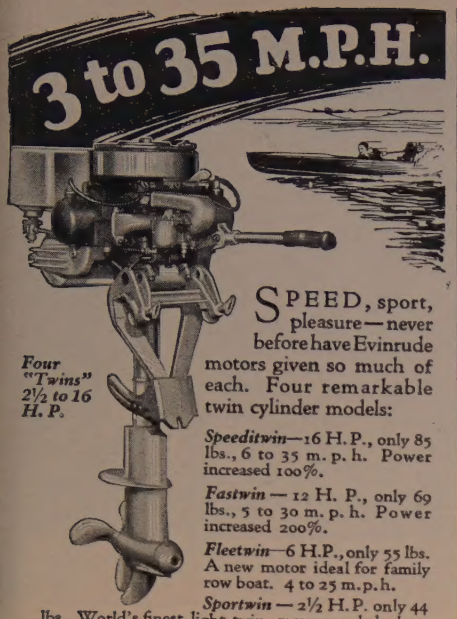

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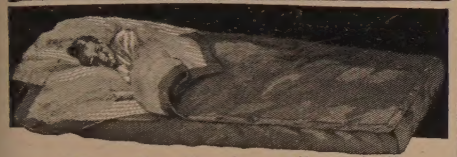

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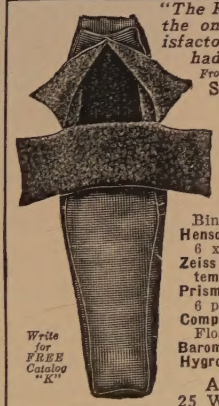
More than $375,000 has been collected from several thousands of Nature lovers to save the 6000 acres of thick growing forest surrounding "The Great Stone Face" the sentinel at the gateway of Franconia Notch in the White Mountains of New Hampshire, and but $25,000 more must be contributed to the office of Philip W. Ayres, forester for the Society for Protection of N. H. Forests and leader of the drive, at 4 Joy Street, Boston, Mass., to bring this tourist shrine under the protection of the Granite State. The campaign for public ownership of this woodland tract, to which more than 100,000 tourists come each year, was begun when tripled lumber prices drew lumbermen to the heavily-forested mountain sides, still bearing some virgin timber. Once the purchase is completed, Mr. Ayres states, competent landscape architects will restore the primeval ruggedness which passing years of commercialism have marred. The "Buy A Tree for $1 And Help Save Franconia Notch" campaign will continue until June 1, when the state option finally expires, he pointed out, and purchasers will be allowed to identify and mark their tree possessions.



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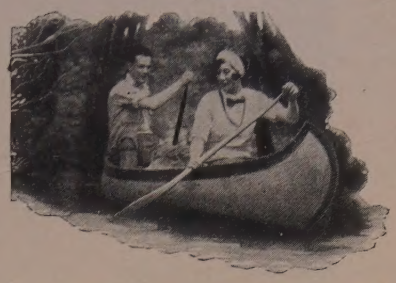

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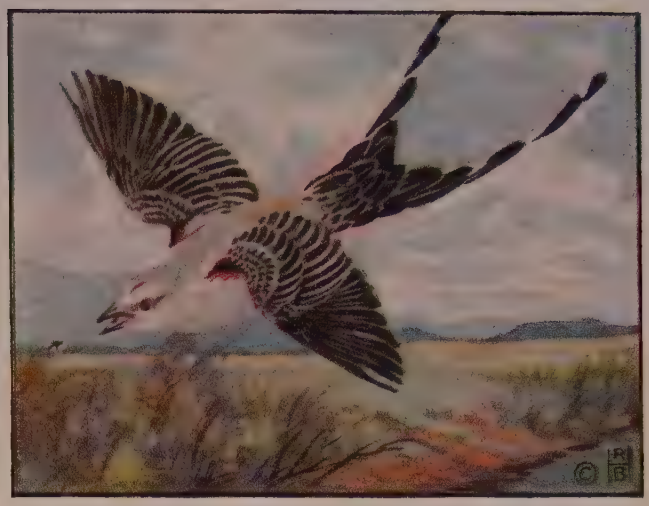


SCISSOR-TAILED FLYCATCHER—*Muscivora forficata*

BUSH-TIT—*Psaltriparus minimus*

CANYON WREN—*Catherpes mexicanus conspersus*

CALIFORNIA JAY—*Aphelocoma californica*

LOUISIANA TANAGER—*Piranga ludoviciana*

Birds of Canyon and Cactus

A Sextet of Colorful Birds of the Southwest

by Carra E. Horsfall

A builder of pendant nests is the bushtit who weaves a nursery out of all proportion to his size. Sometimes as much as ten inches in length, it is shaped like a well-filled old fashioned purse, with an opening at the side near the top. A plant fiber network is carefully attached and interwoven between supporting branches. The birds bounce up and down upon this structure to stretch it into a basket, adding soft fibers and down until the whole is of the required size. Innumerable lining feathers are then carried in to make a warm nest for the wee white eggs. The young number five to nine. Since the chief items of diet are black olive scale and other small insects, bushtits are of considerable value. When the young are grown, families flock together—darting about in the low bushes, squeaking as they hunt for food.

THE SCISSOR-TAILED FLYCATCHER

The verdin is one of our tiniest birds and, like its bushtit cousin, has a penchant for building large houses. However, both birds show considerable originality in their style of architecture. This one selects thorn-covered twigs of desert bushes from which to construct the bulky spherical nest with its doorway low at the side. It is usually placed in a bush or cactus plant about six feet from the ground. The interior is lined with fine grasses, down and feathers and makes a cozy nook in which three to half a dozen wee eggs come to be baby verdins. The male, not satisfied with one nest in the family, builds another for himself, a little smaller with less lining, which he uses throughout the winter, as well as the summer. He is a jovial fellow with a song as much out of proportion to his size as his nest. These birds are found in the mesquite country of the extreme southwestern part of the United States and south into Mexico.

Striking coloration and long outer tail feathers mark the scissor-tailed flycatcher. These, together with the characteristic saw-tooth flight-path, and the penetrating call uttered at the apex of each upward dash, make any mistake in his identification unlikely. He has the renowned pugilistic qualities of the kingbird and is particular to keep his territory patrolled, fearlessly attacking birds of much larger size than himself, alighting upon their backs and pecking viciously, screaming the while. The nest, placed in some thorny bush or small tree, is built of fine rootlets, grasses, bits of wool and feathers. The eggs are usually five in number, and are a clear white marked with purples and browns.

Louisiana tanager is rather widely distributed throughout North America west of the Great Plains from Northern Alberta and British Columbia to our southern border. During migration it may be found in lowlands and hills, but nesting season finds it in higher altitudes. The nest, similar to that of the eastern scarlet tanager, is placed near the end of a branch at a height of from fifteen to thirty feet. It is made of bark strips and grass stems, lined with rootlets and horsehairs, so concealed by foliage as to be practically invisible from below. The male does not share in incubation but feeds the brooding female, and sings to her from the top of a tall tree. The birds begin to hunt when the sunlight first strikes the treetops and continue to feed lower and lower as the insects awaken nearer the earth. Besides this food they are fond of fruit, especially cherries, but will take wild ones in preference to tame varieties because they can be swallowed whole. Therefore, the planting of wild fruit-bearing trees is to the advantage of the orchardist and the satisfaction of the tanagers.

Although canyon wrens sometime build near the habitation of man, they really belong among the rocks and crags of canyons. In this location the soft-walled, moss-covered nest is placed upon a ledge or in some crevice or cranny. The young number five and look much like their parents. This wren is found in some of the warmer canyons of the Sierras and Rocky Mountains, in the Great Basin and south into Mexico. Everywhere its song is the same wonderful exhibition of abandon, the volume being always a marvel to the listener.

California jays seem to have more black marks against them than points in their favor. They are fond of eggs of wild birds or domestic fowl, and are even more partial to newly hatched nestlings. They also enjoy nuts and fruits which they carry off to their homes, if the orchards are near some canyon or arroyo where they nest. They are to be commended for their care of their own kind and for their habits of personal cleanliness, evidenced by their cold morning bath which is a usual before-breakfast performance. They nest in the low chaparral or scrub oaks on both slopes of the Cascades, and from the Columbia River to Lower California.

NATURE CALENDAR

MAY

by E. Laurence Palmer

EVERYONE knows that Memorial Day comes in May. Few realize that the month is one containing a major holiday for both the North and the South and for Canada. On the pages of history, as most of us know, appears a Memorial Day for the northern soldiers and another for the confederate soldiers. In the same month, the Canadians celebrate the birthday of Queen Victoria. We do not, however, celebrate in May, or in any other month, an event that should be commemorated in that month as beneficial, not only to English-speaking people, but to all people and even to dumb animals. On the thirty-first of May, 1881, Pasteur demonstrated conclusively that he had found a method of vaccinating to prevent death by anthrax infection. In doing this he freed more animals including man from possible death than were killed in the war which we memorialize in May. The gratitude of the public to the scientist is not expressed in the same way that it is expressed to the soldier,—if it is expressed at all. Possibly, this is just as well. The vision the biologist has of life differs greatly from the vision of the soldier, just as the vision of a soldier may differ from that of the biologist on the question of war.

Speaking of visions, let me suggest that if you have not read the "Vision of Mirza" by Addison you do so and then make your own vision based on the things you know about life. Fortunately, the human race has nearly two hundred years of experience to its credit since Addison wrote his vision. One cannot help but wonder what he would have written in these times.

Addison was born on a first of May in England. In those days, May Day was a real celebration. People went to the fields early in the morning and collected great masses of hawthorn blossoms. They even called the hawthorn the May tree. They returned, elected the prettiest girl in the village May queen and put in a day of dancing and happiness. In these modern times, our May queen has her picture in the Sunday supplements as early as January. Not a few people have learned that the woody plants bearing attractive flowers are more valuable growing in Nature than wilting over the piano. The possibility is that Addison, were he here to-day, would have an entirely different vision. Certainly, if he collected and smelled some of our American species of hawthorn he would have voted in favor of leaving the flowers undisturbed on the trees on a rather distant hill.

A college professor was recently distressed to have his young son come home from school singing, "Here I come gathering nuts in May". He thought that some rather poor Nature work was being given to teach about gathering nuts in May "on a cold and frosty morning". As a matter of fact the jingle reads "nuts and may" and undoubtedly refers to collecting fruits of the may tree along with nuts. When you see a field of thorn apple in bloom in May, then, you may make your own vision about "gathering nuts and may on a cold and frosty morning" some months hence.

Addison is not the only man of vision to have been born in May. John James Audubon had his birthday in that month. His vision concerned itself with Nature Education through the medium of his brush. The story of his life as written by his wife gives us a vivid picture of the natural conditions of our America in the neighborhood of a hundred years ago. To-day we recognize his success and perpetuate his name in the Audubon Societies which will become increasingly active at this time of year. Instead of imagining that birds spend the winter in the mud and emerge suddenly in May as was thought a little over a hundred years ago we now put bands on their legs and get definite records on them when they are away from home. This may or may not be analogous to modern behavior in human homes. A few things are certain. The month of May in 1928 will find a very different natural America for her May queens than did the May of 1828. She will find Audubon's influence reflected in the absence of bird feathers as articles of feminine finery, even though the modern May queen may enhance her already abundant beauty on a warm day with a steel-trap-killed fur pelt. Would that Audubon's pictures of our native mammals had aroused as much public interest in mammals as did the bird pictures in birds.

The ancient Gauls and Anglo-Saxons thought of the month as the Flower Month. It was essentially a month of rejoicing with them and it is much the same with us. We can, with safety, put aside many of the worries and clothes which winter has required. We can look forward to a period in which the care of the lawn-mower will supplant the care of the furnace. The days will be among the longest of the year and the nights refreshing. We can rejoice over the progress of civilization in the last hundred years and the progress of the season in the last hundred days.

THE STEELHEAD JUMPS

NATURE MAGAZINE

Volume Eleven
No. Five

May, 1928

THE LAMPREY IS NO REAL FISH

MAY DAY in the LITTLE BROOK

Wherein Drama and Contest Follow Their Annual Course

by David Starr Jordan

Illustrated by R. Bruce Horsfall

It is, of course, unnecessary to introduce Dr. Jordan to Nature lovers. All we need say is that we are as pleased as we know you will be to have this story of his here. There will be more. In the meanwhile read this, then go and find yourself a little brook and meet its spring denizens.

All that I shall tell in these pages happened yesterday, for today is the second day of May, and on May first the brooks of three great continents were open again for settlement and the little fishes came up to renew their house-keeping in them. The snow is all gone and the brooks are free to those who know how to use them. This is true of the thousand brooks I have in mind, and California where I write this, has no such brooks. For California is a world all by itself, where nothing that is true in the western half can be depended on in the eastern half. In the Sierras the little fishes have but small part when the river rises

"And calls to all his brooks to follow him
And down they go, headforemost to the sea".

On the first day of May two thousand miles from here, the snow is off and the brook is free to meander quietly through the blossomy meadows far from any incessant demand, sliding along its course through flowery pastures, just as it did two thousand years ago.

In the brook I am thinking of just now, which you may look for anywhere between Cleveland and Des Moines, the first fish to begin the march is the little black lamprey. He hardly counts as a fish for he has yet to learn the first principles of fishhood. The books tell us that a fish is a backboned animal in which the arms and legs are each developed as fins having cartilaginous rays, each one spreading out fanlike to form an oar for swimming. But a lamprey has no bone at all, backbone or otherwise, nothing but soft gristle where the vertebral column ought to be. It has no trace whatever of arms or legs, not even a gristle under the skin to show where arm or leg might have been. Its ancestors, too, had never a trace of arm or leg, else their embryos in the egg would, at least, show rudiments of them. No organ an ancestor ever had can the progeny ever forget. The clinging force of heredity holds on, and some remnant, at least, will always appear. The lamprey, moreover, has no lower jaw, for every lower jaw is a pair of arms locked together at the chin in front. It is, as it were, two short hands clasped

together in front and never unloosed for aught reason.

Though the lampreys have no limbs and no jaws and are not real fishes at all but a wicked imitation, they have never learned the difference and they come up the brook as the snow vanishes, rushing up the ripples and swirling about in the eddies, just as if they owned the brook, and were fishes like the real owners. A lamprey is a long, slender and slippery fellow, shaped like an eel and without any scales. He has no fins except a low fold along the vertebral column around the tail and coming half way back on the under side, just fin enough to keep him from tipping over in his business. Instead of gill openings he has a row of seven tubes or pouches along his sides through which the water he swallows may escape, purifying the blood in the capillaries around them, as it flows along. In front the lamprey seems to be cut off short, but if we look carefully we see that the body ends in a round disk of a mouth, and that this disk is beset by rows of sharp teeth. A row of the sharpest of these is placed on the tongue, and two of these are above the gullet for the tongue to scrape against them. And the rest are all blunt and are scattered over the surface of the mouth which, without lips or jaws, is surrounded by a belt of fringes. Truly a peculiar fellow.

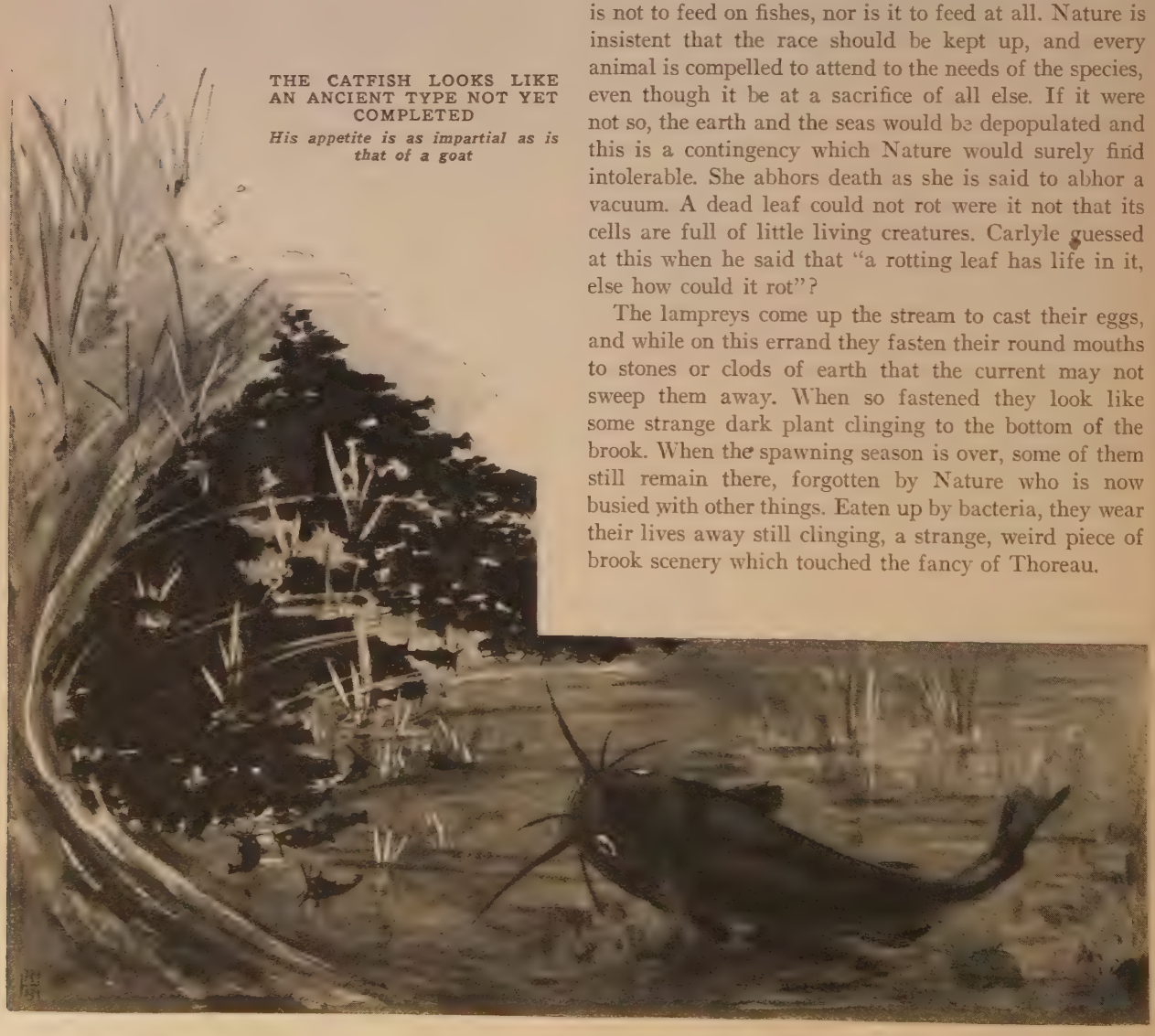
When the lamprey is hungry he puts his mouth against the side of some fish, exhausts the water between them, and then the pressure of the outside water holds him there tightly. When the fish swims away the lamprey rides with it, giving no thought to where he is going, but all the while scraping away the flesh with his rasp-like teeth. When he has filed off enough fish flesh and sucked enough fish blood to satisfy his hunger he lets go and goes off about his own affairs. The fish, who does not know what hurt him, goes off to get well if he can. Usually he cannot, for the water of the brook is full of germs of minute toadstool-like plants, and these fasten themselves on the fish's wounds and make them bigger and bigger until at last the cavity of the abdomen is pierced, and little creatures of many kinds, plant and animal, go in there and plunder all the fish's internal organs, carrying them away, atom by atom, for their own purposes.

THE SUNFISH ARRIVES

Pumpkin seeds they are called, because of their shape, and small size

But when the lampreys come up the April brook it is not to feed on fishes, nor is it to feed at all. Nature is insistent that the race should be kept up, and every animal is compelled to attend to the needs of the species, even though it be at a sacrifice of all else. If it were not so, the earth and the seas would be depopulated and this is a contingency which Nature would surely find intolerable. She abhors death as she is said to abhor a vacuum. A dead leaf could not rot were it not that its cells are full of little living creatures. Carlyle guessed at this when he said that "a rotting leaf has life in it, else how could it rot"?

The lampreys come up the stream to cast their eggs, and while on this errand they fasten their round mouths to stones or clods of earth that the current may not sweep them away. When so fastened they look like some strange dark plant clinging to the bottom of the brook. When the spawning season is over, some of them still remain there, forgotten by Nature who is now busied with other things. Eaten up by bacteria, they wear their lives away still clinging, a strange, weird piece of brook scenery which touched the fancy of Thoreau.



THE CATFISH LOOKS LIKE AN ANCIENT TYPE NOT YET COMPLETED

His appetite is as impartial as is that of a goat

When the young are hatched they come out transparent as jelly, blind and toothless, with a mouth that seems only a slit down the front end of the body. These little creatures slip down the brook unobserved and hide themselves in the grass and lily pads till their teeth are grown and they go about rasping the bodies of their betters, grieving the fishes who do not know how to protect themselves.

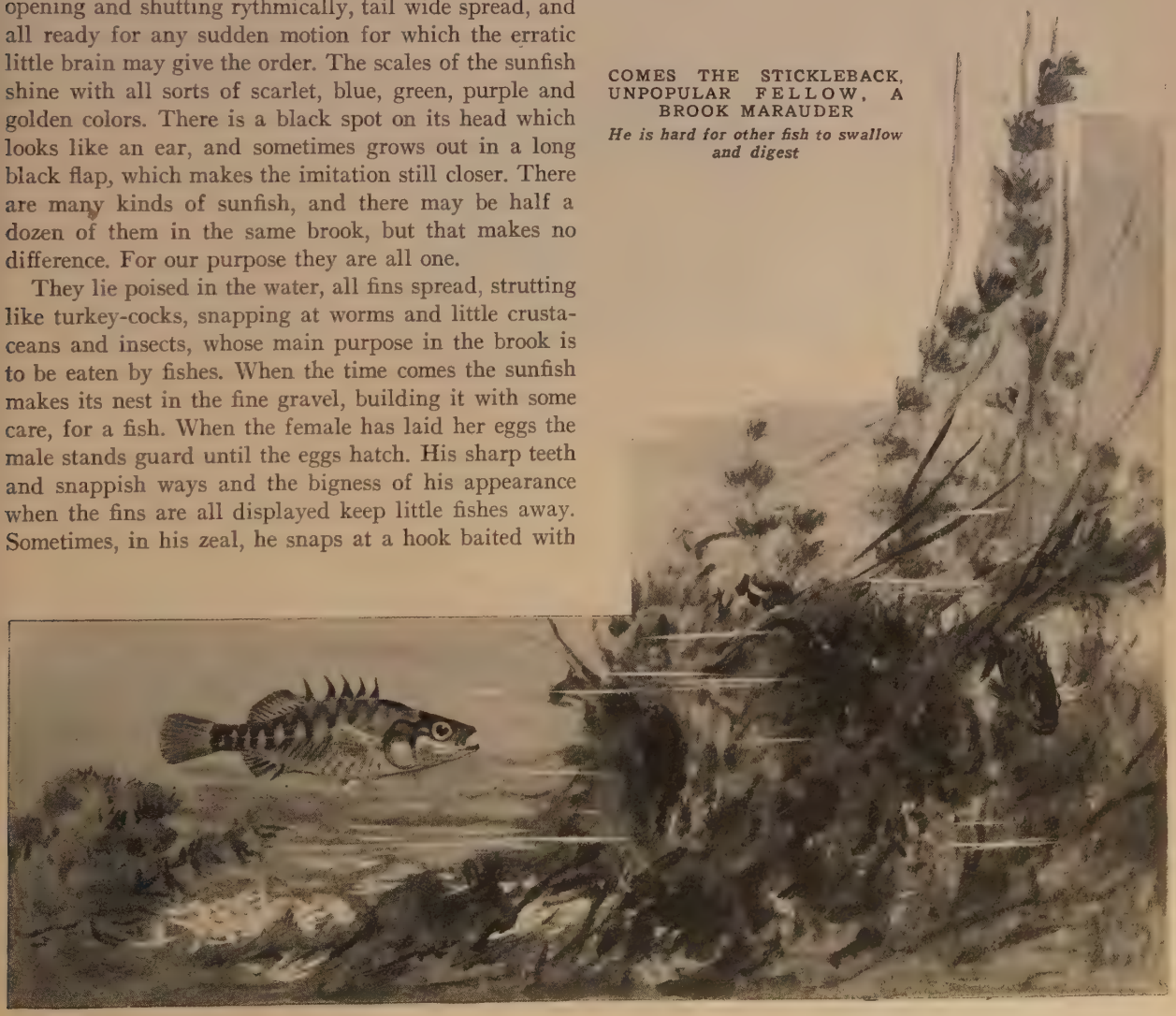
THE SUCKERS ARE MANY
Coarse, harmless, stupid fellows are they all

Before the lamprey fades away the real fishes begin to come. They have stiff back-bones of thirty vertebrae, more or less, and developed fins which take the place of arms and legs. They have a big gill opening behind the head and the body is covered with scales. Courage they have also. First of all in our brooks is some one of the various tribes of sunfishes. In New England they are called pumpkin seeds in derision of their small size, but they make up for that in increased spirit. For they are swift, vigorous and full of life, bright and fresh, each "like a coin fresh from the mint". Finny arms and legs wide apart, gills moving, mouth opening and shutting rythmically, tail wide spread, and all ready for any sudden motion for which the erratic little brain may give the order. The scales of the sunfish shine with all sorts of scarlet, blue, green, purple and golden colors. There is a black spot on its head which looks like an ear, and sometimes grows out in a long black flap, which makes the imitation still closer. There are many kinds of sunfish, and there may be half a dozen of them in the same brook, but that makes no difference. For our purpose they are all one.

They lie poised in the water, all fins spread, strutting like turkey-cocks, snapping at worms and little crustaceans and insects, whose main purpose in the brook is to be eaten by fishes. When the time comes the sunfish makes its nest in the fine gravel, building it with some care, for a fish. When the female has laid her eggs the male stands guard until the eggs hatch. His sharp teeth and snappish ways and the bigness of his appearance when the fins are all displayed keep little fishes away. Sometimes, in his zeal, he snaps at a hook baited with a worm. He then makes a fierce fight, and the boy who holds the rod is sure that he has a real fish this time. But when the sunfish is out of the water strung on a willow rod, and dried in the sun, the boy realizes what a fuss a very little fish can make.

When the sunfish goes then the catfish will follow—"a reckless, bullying set of rangers, with ever a lance at rest". The catfish looks like an ancient type not yet fully completed, but this is not the case, for the seas were full of fish at least a million years before any catfish existed. But he lacks much that a modern fish should have. He has no scales and no bright colors. His fins are small and his head and mouth are large. Around his mouth are eight long "smellers", fleshy feelers, that he pushes out as he crawls along the bottom in search of anything that he may eat. As he may eat anything, he always finds it. His appetite is as impartial as that of a goat. Anything, from a dead lamprey or a bunch of sunfish eggs to a piece of tomato can, pleases him. In each of the fins which represent his arms is a long sharp bone with a slimy surface and a serrated edge. These are fastened by a ball-and-socket joint, and whenever the fish is alarmed, the bone is whirled over and set in place; then it sticks out stiffly on each side. There is another such bone in the fin on the back, and when all

COMES THE STICKLEBACK, UNPOPULAR FELLOW, A BROOK MARAUDER
He is hard for other fish to swallow and digest



these are set, there is no fish that can swallow him, at least, not with satisfaction.

When he takes the hook, which he surely will do if there is any hook to be taken, he swallows it greedily. As he is drawn out of the water he sets his three spines and laughs to himself as the boy pricks his fingers trying to get the hook from his stomach. This the boy is sure to do, and it is because the boy of the Mississippi Valley is always fishing for catfish that his fingers are always sore. The catfish is careless of the present and sure of the future. After he is strung on a birch branch, dried in the sun and sprinkled with dust, and has had his stomach dug out to recover the hook, he will swim away if he falls into the brook. He holds no malice and is ready to bite again at the first thing in sight.

BRIGHT FELLOW, JOHNNY DARTER
He paints the bottom with the colors of the rainbow or sunset

The catfish uses his lungs as an organ of hearing. The needless lung has become a closed sac filled with air, known as the swimming bladder. In the catfish,—as in the suckers, chubs and most brook fishes,—the air bladder is large and is connected by a slender tube,—relic of a wind-pipe,—to the gullet. At its front it fits closely to the vertebral column. The anterior vertebrae are much enlarged, twisted together, and through them passes a chain of bones which connect with the hidden cavity of the ear. The air bladder therefore assists the ear of the catfish as the tympanum and its bones assist the ear of the higher animals. An ear of this sort can carry little range of variety in sound. It probably gives only the impression of a jar or disturbance in the water.

AND, LAST, COMES THE BLOB
He hides in darkness and picks up all that there is left

The catfishes lay their eggs on the bottom of the brook without much care as to their location. They are not, however, indifferent to the fate of the young, for when the little fishes are hatched one of the parents swims with them into shallow waters, brooding over them and watching them much as a hen does her chickens. In shallow ponds the young catfishes make a black cloud along the shores, and most other fishes let them alone.

In the spring come the suckers large and small, coarse, harmless, stupid fishes, who have only two instincts, the one to press to the head of the stream to lay their eggs, the other to nose over the bottom wherever they go, sucking into their puckered, toothless mouths every organic thing, from water moss to fish eggs. They have no other habits to speak of, and when they have laid their own eggs in a sandy ripple they care no more for them, but let go of activity and drop down the current of the river whence they came. There are black suckers and white suckers, yellow ones, brown ones, red ones and mottled, and there is more than one kind in every little brook, but one and all are harmless dolts, the prey of all larger fishes, and so full of bones that even the small boy who knows his fish spits them out after he has cooked them.

Then come the minnows of all forms and sizes; the female, dull colored and practical, laying her eggs automatically when she finds quiet water and thinking no more of them afterward; the male, feeble of muscle, but resplendent in color, with head and fins painted scarlet or purple, or silver white or inky black, according to the nature of his kind. His mouth is small and without teeth, for he feeds on creatures smaller than fishes, and his head in the spring is covered with coarse warts, nuptial ornaments, which fall off as soon as eggs are properly disposed of. In the little brook I see as I write, two kinds of minnows come up the streams together before the others realize that it is verily spring. The one is small, dainty, translucent and active, swimming free in the water near the surface and able to take care of itself when pursued by the sunfish or bass. Along the side of its body are two black stripes not quite parallel, and between and below them the silvery scales are flushed with fiery scarlet. The fins are all yellow, with scarlet at base, and as the male passes and repasses before the female, all these colors, which she has not, grow brighter than ever.

The next is a larger fish, clumsy in form, hugging the bottom as he swims. The whole body of the male is covered with coarse white warts, and across each fin is a bar of black, white and orange. This minnow, called "Crawl-a-bottom" by the boys, feeds on mud, or rather on the little plants which grow in the mud, and his intestines are lengthened proportionately. In fact, they are so long that to economize the space, they are wound spool-fashion about the air bladder in a way which happens in no other animal.

Of the other minnows, the one scares his rivals by his big, jet-black head; another by the painted fins, which shine like white satin; another by his deep blue sheen, which is washed all over with crimson. In fact, every conceivable arrangement of bright colors can be found, if we go the country over, as the adornment of some minnow when he mates in the spring. The only exception is green, for to the fishes as to the birds, green is not a color. It only serves to cover color, while the purpose of real color is to be seen. And there are fishes whose colors are so placed that they are hidden from birds above and from fishes below, but are seen of their own kind which looks at them from the side.

More interesting than any of these, the brightest fishes in the world, are the "Johnny darters" in our little brook. If you look at them from above you will hardly see them for they are dull olive on the back with dark spots and dashes, like the weeds under which they lie. The male is only a little fellow, not so long as your finger, and slim for his size. He lies flat on the bottom,

half hidden by a stone, around which his tail is twisted. He will stay there for hours, unseen by other fishes, except by his own kinsmen. But if you reach down to touch him with your finger, he is no longer there. The tail straightens out, there is a flash of blue and scarlet, and a foot or two away he is resting quietly as before. On the bottom is his place and he seems always at peace, but when he moves, his actions are instantaneous and as swift as possible for a creature who lives in the water. On the bottom, among the stones, the female casts her eggs. Neither she nor the male pays any further attention to them, but in the breeding season the male is painted in colors as beautiful as those of the wood warblers. When you go to the brook in the spring you will find him there, and if you catch him and turn him over on his side, you will see the colors that he shows to his mate, and which, observation shows, are most useful in frightening away his younger rivals. The female does not choose the bright colored fish, but the young ones, not in full color, choose to keep away from him. But do not hurt him. Put him back in the brook and let him paint its bottom the colors of a rainbow, a sunset or a garden of roses. All that can be done in gold, crimson and blue pigments in fish ornamentation you will find in some brook in which the darters live. It is in the limestone brooks that flow into the Tennessee and Cumberland where they are found at their brightest, but the Ozark region comes in for a close second.

There will be sticklebacks in our little brook, but the other fishes do not like them, for they are tough and dry of flesh, and their sharp spines make them hard to swallow and harder still to digest. They hide beneath the overhanging tufts of grass, and dart out swiftly at whatever passes by. They tear the fins of the minnows, rob the nests of the sunfish, drag out the eggs of the suckers and are busy from morn to night at whatever mischief is possible in the brook.

In the sea the sticklebacks are mostly silvery with a metallic sheen like that of a new milk pan, but in the brooks the male in May is jet black, with a trimming of copper red. He builds a clumsy nest of twigs and weeds open at both ends like a tunnel. Into this creeps his mate, dark olive and usually smaller than he. She lays her eggs in the nest and then passes on. The male, temporarily widowed, secures another mate and then another, each one laying her set of eggs. Over the whole the male stands guard in a way we would call dauntless in a hero more than two inches long. Very often he has to repel the attacks of his too numerous wives, who, being relieved of all family cares, are prone to turn cannibal. Even the smallest dwellers in the brook have their little adversities and perversities.

Last of all comes the blob, or miller's thumb, who hides in darkness and picks up all that there is left. He is scaleless and slippery, large of head, plump of body, and with no end of appetite. He lurks under stones when the water is cold. He is gray and greenish like the bottom in color. He robs the buried fish nests, swallows the young fishes, devours the dead ones and checks the undue increase of all, not forgetting his own kind.

When he has done his work and the fall has come and gone, and the winter and the spring return, the brook once more fills with fishes, and there are the same kinds with the same actions, the same ways and the same numbers, the same thing over and over as in the fabled endless succession which in certain philosophical mythologies is said to beset the whole solar system.

Carmen Sylva, the poet queen of Roumania, tells us that the sun, on his May-day rounds, sees each year the lovers, the flowers and no doubt the little fishes, each time imagining that "he sees the self-same lovers and flowers because, he is immortal". But they are not always the same. They all move on. From year to year the old stage remains or seems to remain, but every Maytime brings new actors, who, like you and me, "repeat lines written for them centuries before they were born". But each generation changes just a little, in its lovers, its flowers, its birds and its fishes, just as the brook itself changes and the meadow, and the melting snowbank.

A CALIFORNIA NUMBER

It may seem rather early to be discussing the October issue of Nature Magazine in May but in doing so we hope to serve our members and readers. That issue is to be a California number, practically from cover to cover. It inaugurates a policy that will be followed from time to time with Nature Magazine. Periodically—perhaps two or three times a year,—one issue will be devoted to Nature as exemplified by a certain section of the country.

California is, of course, notably rich in its variety of flora and fauna, its climate and scenic beauties. It was therefore chosen for the inauguration of the new policy, and a remarkable group of articles by an equally notable group of writers will be presented. Your editors are already at work on the physical and editorial details of this issue. Mr. Horsfall has completed a beautiful painting to be reproduced as a frontispiece and Mr. Jex a most alluring cover. Pictorially and textually the main body of the magazine is planned to set a new high standard.

This announcement is being made at this time in the belief that many members will wish extra copies of this issue, either for themselves or for sending to friends. Four copies will be mailed to any four addresses for one dollar, and additional copies at a like rate. Orders placed in advance will enable us to determine the number of excess copies to print and orders will be received up to the fifteenth of August.

We can assure you that the October California issue will be one you will be proud to send to a friend or keep for yourself.

THE LOTUS OPENS TO THE MORNING SUN

In many places it has become extinct due to immoderate picking for commercial reasons

The Celestial Lotus

IN LEGEND a symbol of ancient and sacred mystery, in science a marvel of structure and adaptation, the lotus is the most strangely fascinating of flowers. To the people of Japan, Korea, China, Siam, Java, Persia and India, it is a sacred flower, the very center of religious and mythological symbolism. On the purely aesthetic side, too, it is for these races the flower of flowers. As the rose is with us the universal favorite, so, in the Orient, the lotus is close to the hearts of the people.

There are but three living kinds of lotus which make up the genus *Nelumbo.* The old world species, *Nelumbo speciosum,* with roseate flowers, is by far the best known and is popularly called Egyptian lotus because it is supposed to have been sacred to the Nilotics. As a matter of fact both Egyptologists and botanists are pretty well agreed that, like papyrus, it was not a native of the Nile and was not brought there until the Egyptian race was in its old age in the period of Persian influence. The sacred water plant of early Egyptian times was a true water lily or *Nymphaea,* which has floating leaves. A genuine lotus may, even in conventionalized designs, be easily distinguished by the way in which its leaves stand upright on stiff stalks, high out of water. So there is little doubt that "Egyptian lotus" is something of a misnomer as the plant was only cultivated along the Nile between 500 B.C. and 1000 A.D. Then the conquest by the Saracens caused it to disappear until a few years ago an Englishman discovered a few plants in Egypt, apparently self-sown, sole remnants of the great days of lotus on the Nile.

The oriental lotus has its native home from Japan and China to India, and, in Persia, to the quiet brackish bays of the Caspian Sea. It is found also throughout the East Indies to northern Australia, and cultivation has carried it to all parts of the world. Almost every Buddhist temple garden has a lotus pool, because lotus symbolizes lofty thought and the inner gem of moral purity. No occidental can comprehend the beautiful significance which the flower must have to the devout oriental heart. We can only guess it from the feeling which lotus stirs in

Sacred to the Oriental; Enchanting to the Occidental

by Donald C. Peattie

us. The great, fragile, delicately blushing petals and the beautiful great bluish leaves have about them a serene calm and celestial loftiness that call forth from us, as no little, pretty flower can, a tribute of appreciation.

The lotus has haunted the minds of the oriental artists from earliest times. In the accompanying picture, which is thought to be a Mung reproduction of a Sung design,—that is, a Fifteenth Century copy of a Tenth Century picture—the artist has portrayed the lotus in its natural habitat, with two other aquatic plants which are clearly recognizable, the arrowhead and the water smartweed. Beside the great white blossoms are two splendid aquatic birds. The original is so ancient that its colors have nearly faded, but one may still make out the marvelous blue color of the under sides of the leaf, and the exquisite shading and veining of pink at the tips of the white petals. Even the photograph illustrates, as no words could, the characteristic appearance of the bud and half uncoiled leaves.

Outside all mystic or aesthetic value, the oriental lotus has its utilitarian virtues. The seeds are split and boiled and cooked with fat, like beans; many Chinese importers carry them, and you may try them for yourself. Probably, however, you will not like either the taste or the smell. The roots also are eaten and are said to be starchy and sweet.

The lotus grows in America as well as in the Orient, and it is often thought that our species is the "Egyptian" lotus. As a matter of fact it is a wholly separate species, with yellow flowers and anthers hooked with an appendage, though in other ways closely resembling the old world lotus. It grows along the coastal swamps of the Atlantic from New Jersey to southernmost Florida and around the Gulf of Mexico and the Caribbean shores. It is also found rather generally in the Mississippi Valley and along the Great Lakes; in New England its occurrence is perhaps to be attributed to introduction by Indians, because of its edible seeds and roots.

In contrast to the reverence with which the old world lotus is regarded, our native species is too often treated with contemptuous greed. Immense quantities have been thus destroyed.

LOTUS AND HERONS,—AN ANCIENT PAINTING

A Ming painting on silk, reproduced for the first time by courtesy of the Freer Gallery

It was formerly abundant in the reedy lakes southeast of Chicago, but it is now very rare in that region. While botanizing there once I met a nurseryman's collector who told me how many thousands he used to pick on Wolf Lake and the Calumet River every year, and then complained that after about ten years of this work the lotus "gave out on him". Moderate picking by flower lovers would do no harm; commercial exploitation of the lotus means its death.

Beside our native lotus, *Nelumbo lutea,* there is another one, *Nelumbo jamaicense,* of Jamaica, which differs only in having a narrower appendage on the anther. Discovered in a coastal lagoon in 1754 by Dr. Patrick Browne, an Irish physician who lived on the island but a short time, it seemed a few years later to have vanished. Drainage and other changes in the landscape destroyed the original collecting ground, and not until nearly one hundred years later was it again found and sent to the Royal Botanic Gardens at Kew, England.

All three kinds of lotus possess, beyond the charm of their mythology, romantic stories, and beauty, a great fascination for the scientist. Nelumbo, like its relative, the water lily, is regarded as a primitive flower, from the standpoint of evolution. The indefinite number and random arrangements of the sepals, petals, and stamens go to show that the lotus flower has not been moulded by the hand of evolution into a definite and simplified arrangement like that, say, of the primrose. The lotus is still in that primitive stage that illustrates that the parts of a flower are only modified leaves, changed slightly by centuries.

As for the true leaves of the lotus, they are one of Nature's wonders. The leaf-stem, which is not infrequently ten feet long, standing generally more than half out of water, is provided with several large interior air canals. The stalk meets the blade of the leaf in the center on the under side, just as in the nasturtium leaf, and like it, the veining of the lotus leaf is remarkable for being a series of radial spokes from the center of the leaf. Like the nasturtium again, the lotus leaf when dipped under water glitters with thousands of silver bubbles. The under surface of the leaf is a beautiful bluish color, the upper a dark and splendid green. Leaves three feet across are by no means infrequent.

The flower of the American lotus has been described by one writer, who observed it closely, as opening just before morning on four nights in succession. The first morning it opens only partially, like a great goblet; by the time the sun is fully up, the flowers close again. The second morning the flowers open still more and do not close till night. On the fourth day the color fades to white, and the flowers expand to full blown glory. But the petals never close again; they drop off and drift upon the surface of the water.

The fruit that follows the flowers is no less wonderful. It looks like the nozzle of a watering can, and is so ornamental that great quantities of it are annually used in dried bouquets. Some people can find it in their hearts to gild these pods. As well gild the rose.

In each small crateriform opening in the pod an acorn-like seed is sunk. These

A LOTUS GARDEN OF OLD CHINA

Every Buddhist temple has its lotus pool and the priests chant to the flower

seeds are not ejected from the pod. In fact the pod remains erect for a long time, drying in the autumn until very light and brittle. At last the elements break it off and the whole pod then goes floating away on the surface of the water, head downwards. Wetting and decay cause the pod to disintegrate, and the seeds, released, sink to the bottom of the water to germinate.

The very hard outer shell of the seeds gives them great longevity. A newspaper story recently reported that lotus seeds found in the mud of a lake in the desert of Gobi, which had dried up hundreds of years ago, had sprouted. The story needs confirmation, not that the honesty of those who planted and raised the seeds is doubted, but that the length of time the lake has been dry might be difficult to determine to the satisfaction of other scientists.

If you wish to grow lotus in your home pond or even in a small artificial lily pool, buy or secure from friends or collect yourself some seeds and sow them on the water, though not on any body of water that has currents or strong waves. The healthy seeds will sink and in a few weeks or at least by next season, the plants will sprout. Within a year you may expect to be blessed with a fragrant flower of supreme, unearthly enchantment.

(Below) STEADY!
No fireman on his greased pole could be more agile than he

(Above) OVER THE TOP
Preliminary balancing before starting a dangerous somersault. Caught in an awkward moment

(Below) ALLEZ-OOP
A flagpole sitter nonpareil was our tree toad

A Tree Toad Gymnast

Great Feats of Daring Could He Perform

by Ralph F. Pratt

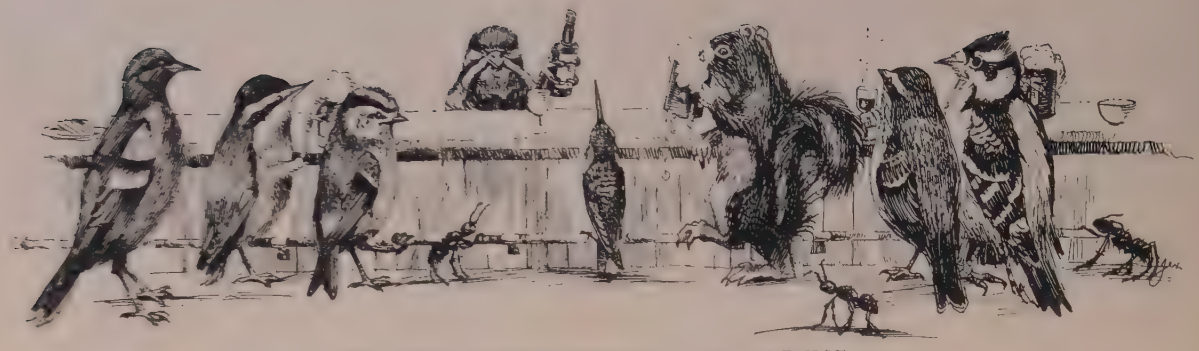
HE was a gay little toad. And he lived under the leaves of a pot of begonias in the living room after we had captured him from the big maple in the yard. Friendly, too, he was—he liked to sit for long spells on one's hand, or extend himself precariously on one's finger. Just whistle for him, and he would come, and appear to be very attentive. That is, if a fly didn't make the mistake of lighting near him—then he would dart and gobble the fly. But he'd immediately return, and look up as if to say, "Pardon the digression. Do go on"!

He took his exercise in the evenings, hopping around the room, and climbing up the furniture and the walls. He might drop on you from anywhere after the twilight fell, and you were liable to sit on him, unless you watched out.

Best of all, however, he liked his gymnastic tricks on a section of a fishpole we placed across a chair for him, or stood upright in a corner. He would swarm up it, if it were vertical; and if it were near enough horizontal, he turned somersaults and giant swings upon it like a star performer in a circus. Never seemed to get tired. You didn't have to say "Flies, Dan'l", either, to make him take long jumps.

"FLIES, DAN'L"
Ready to spring on an unsuspecting insect, that dared to light near his flower pot home

He didn't sing or trill—just seemed content to catch flies, and be acrobatic. On bright spring days he would sit out on the window sill and sun himself. On rainy days, his light-colored coat would darken, and he would be hard to find as he roamed about. When the cold weather came, however, he went to sleep under some moss that covered the dirt in the flower pot, and stayed lazy and quiet until the spring. Then spring called from the pond, and our gymnast slipped away.



THE RACE OF BARTENDERS IS NOT EXTINCT
But the "bars" the birds maintain and patronize are quite within the law,—only soft drinks served

BIRD "BARTENDERS"

Prohibition Forces Fail To Close Them Up, However

By W. L. McAtee

Photograph by Dr. Thos. S. Roberts. Heading by Jex.

THE RACE of bartenders is not yet extinct in our country. At least three of these gentry remain who purvey the "real stuff", and strange to say the dry forces are doing nothing whatever about it. However, this oversight may be excused for the prohibition agents probably do not even know of these bartenders three. In fact most people know little or nothing of them. And who are they? No other than those strange members of the woodpecker race known as sapsuckers. One of them tends his bars from coast to coast, while the other two operate only in the western states.

Sapsucker bars are most often opened on maple, birch, apple, and other trees yielding sweet sap, which forms the stock in trade. No bartender was ever more particular about orderly arrangement of his spotless glasses than are the sapsuckers in ranging their drinking receptacles or sap cups in regular rows around the trunks and branches. These sap pits are drilled straight through corky outer, and tender inner bark, and sometimes slightly into the firmer sapwood. They slope downward as they run in and are well shaped for holding sap.

So that the supply of drink may always be plentiful the sapsucker usually makes a few new holes each day, or freshens some of the old ones by enlarging them. When he has several girdles of pits on each of a number of trees conveniently grouped, he can settle down to a happy life. He makes the rounds of his cups with great regularity and persistency, and has been seen to linger over a specially-liked sap for hours, even all day long.

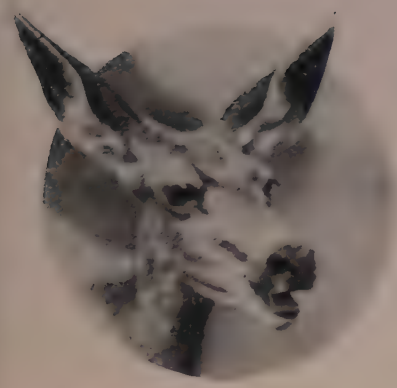
The sap of some particular kinds of trees and that of almost any of the sugary favorites when fermented, seems intoxicating, for the sapsuckers apparently become stupefied after tippling it too long. This is not good form for bartenders but in another way the sapsuckers thoroughly deserve the name.

Their bars attract the thirsty in numbers and variety. Other woodpeckers, especially the downy, are wont to slip in now and then for a drink, and the aristocratic oriole named for Lord Baltimore lends class to the patronage of the sapsucker bars. Nuthatches, kinglets, and warblers swell the crowd, but the most regular patrons are the humming birds. These little fellows have even more of a sweet tooth than the sapsuckers, and cannot pass by the temptations of sap fountains.

Though the rightful owners may wish to chase them away, and succeed in doing so at times, the hummers are so swift and agile that they no doubt get all of the liquid refreshment they want. They are elusive petty grafters on the sapsucker's bounty, while such larger topers as the squirrels may be said to crash the bar. No matter how the bartender might feel about it he could scarcely drive away these larger and bolder pests.

TENDING BAR
Yellow-bellied sapsucker and his pits on a tree

The sapsucker bars are attended also by a host of insects, as ants, bees, wasps, flies, moths, and butterflies. When the sap is flowing freely, a bird bar is very busy, with squirrels and warblers casually dropping in, with hummers buzzing about on the swiftest wings, and with insects fairly swarming, and all are spongers. However, the birds do not provide enticing drink entirely without compensation. Remember the ants and other bugs; the bird bartender eats such customers.



HA-HA-HA!
Something seems to have tickled the mule deer, who has a good sense of humor

THE LAND of TOO MANY DEER

Another View of the Kaibab Problem

by Hugh Stevens Bell

Photographs by the Author and Francis Parks

BIG EARS
But the better to hear with, when hunters are abroad. This deer has become a problem

I STOOD gazing into the display window of a hardware store in Flagstaff, that interesting metropolis of northern Arizona which basks on the delightful southern slopes of the San Francisco Peaks, late volcanoes of commanding size. Near that city are aspen glades where deer are found, and wilderness solitudes in which mountain lions seek their prey by night. There are other of the fleeting folk of the woods and desert too numerous to mention, and wild flowers, gorgeous ones, in rich abundance. 'Tis a glorious heritage, an heritage any growing city might well cherish.

In that window before me was one of man's most prized inventions,—a modern, high powered rifle. Irvin S. Cobb explains that such a gun is called an express rifle because its missiles make no local stops. There was a neat sign which informed the citizens of northern Arizona that this dwarfed cannon was a prize for the hunter who brought in the finest head during the impending open season on deer. Why doesn't some enterprising firm offer a scatter-barrel shotgun and a six-pound axe to the industrious person who shoots up and chops down the largest and most unsightly billboard?

Those deer which grace the forests of the San Francisco Peaks are none too numerous, but aside from them there is, within a day's auto trip of Flagstaff, one of the greatest herds of deer in the world, and it roams about in the largest area of virgin timber in these United States of America. Those deer and the buffalo of House Rock Valley are near neighbors in summer, but in winter they are occasionally confreres in the same great outdoor "eating club".

I had just arrived in Flagstaff after a few weeks on and about the Kaibab. Calling to mind the multitudes of deer which had refused to stop eating long enough to even notice my roaring flivver as it passed, and remembering how much like pastured cattle they were in their behavior towards a mere human, I was sorely tempted to enter that store and suggest that a second rifle should be placed there,—a fitting reward for the valiant hunter bringing in the largest head of a Hereford steer, providing that the herds grazing to the north of the great peaks had become sufficiently gentle to make an open season certain of success.

BROWSING TIME
But where can this lord of the Kaibab find food, with the trees stripped ten feet from the ground?

But despite their tameness while we remained in the car, those deer were not enthusiastic about associating with that variety of *Homo sapiens* known as a photographer on foot. Consequently we are forced to admit we didn't get the pictures we desired, yet if the expedition had only been equipped with a camera built along the lines of that choice bit of artillery before mentioned, we could have obtained many excellent pictures across a ten acre lot or through a quarter mile of forest.

Seriously, the great herd of mule deer on the Kaibab has presented the nation with a

SUNSET REFLECTIONS

A mule deer and her fawn come for a cooling drink in the eventide

real problem for some years. In 1923 the United States Biological Survey requested such competent observers as E. A. Goldman, S. B. Locke and George Shiras, III, to investigate conditions which were even then reported to be deplorable.

The reports which these men eventually submitted were emphatic in stating the urgent need for immediate action to prevent a progressive destruction of the range which was wholly incapable of supporting so vast a herd. The aspens, favorite browse, had been defoliated as high as a buck could reach,—nearly ten feet,—and there were no young trees under the age of five years. That, the observers felt, was sufficient proof that the situation was of long standing. Dwarf ceanothus, white fir, snowberry, mountain ash and dogwood also were feeling the ravages of the herd.

Now the deer is essentially a browsing animal, but it has too much good common sense to refuse to graze when browsing is poor. Though seemingly crowded beyond their ability to maintain themselves against those nibbling thousands, the available grazing lands on the Kaibab are still holding up surprisingly well, and they were in good shape at the time the observations of 1923 were being made. Nevertheless it seemed obvious that things had come or were coming to a terrible pass.

"But", you ask, "had not there been mule deer on the Kaibab for ages? Had they not successfully solved their problems in the past? Was there any reason to believe they had suddenly become incapable of handling their own affairs"? All your questions must be answered in the affirmative. Times and conditions had changed on the Kaibab.

Possibly you know that the southern margin of the Kaibab Plateau is the famous north rim of the Grand Canyon, and now a part of one of our great national parks. A presidential proclamation of 1893 set aside the Kaibab as a part of the Grand Canyon Forest Reserve. In 1906 the establishment of the Grand Canyon Game Preserve,—actually the Kaibab Plateau,—set the stage for a great drama of wild life which has only recently reached a climax. It was intended that the play should be a comedy, but certainly the climax has all the characteristics of a great tragedy.

When the game preserve was created there were thought to be 3,000 deer in the herd, and they were held in check by Indians, white hunters, wolves, bobcats, coyotes and mountain lions. A stroke of the pen stopped human hunting of deer, and sent paid hunters to destroy the animals which preyed upon them. According to one set of statistics we learn that to date approximately 700 lions, 3,000 coyotes, 125 bobcats and a dozen wolves have been destroyed in the region. "Uncle Jim" Owens claims to have destroyed personally 119 lions in a period of two and one-half years which ended in 1910.

My own observations, in fact, convince me that mule deer does are quite commonly the mothers of twins. This remarkable fecundity coupled with a fairly complete immunity from the ravages of natural enemies could only result in the rapid growth of the herd, already strong in 1906, to such size that the capacity of the original range would soon be reached, then exceeded, with trouble certain to follow.

The reports of 1923 indicated that such a state of affairs was imminent. To those who can see in a deer something more than a target, the news was decidedly unpleasant, and they were slow to believe that it was true. But some sportsmen gleefully held up their hands in something akin to holy horror and pointed to the bung-

FLIRTATION

Shockingly bold is the younger generation. This fawn divides a bit of candy with the author

ling mess sentimentalistic methods of protection had brought about. "Something must be done about it", they shouted, and held out their rifles as the logical and infallible cure for the evil, immediately abandoning themselves to a widespread epidemic of itching trigger fingers. Those fingers got no relief for two years. Then an open season was established with a quota of one buck for each hunter.

Although this open season was the direct result of recommendations from the observers of 1923, there were many who accepted it reluctantly for they sincerely felt that some better way might be found. For many years the Forest Service had been aiding the deer by reducing the number of cattle, horses and sheep which were allowed to graze on the Kaibab, but there were still thousands left. It was suggested that further reductions would help some, though, of course, the situation had become too acute to be relieved entirely by so simple a step.

Some thought that the deer could cope with the situation themselves, arguing that once the range actually became overcrowded many of the deer would move on to those famous distant fields which are always greener. Certainly that argument sounds reasonable until you have been on the ground. Then you discover that approximately two-thirds of that portion of the Kaibab which the deer frequent is surrounded by the mile deep gorge of the Grand Canyon or its ramifications. The other third drops more or less rapidly to a comparatively low-lying semi-desert across which the deer must make a long journey to reach suitable lands to the north, northeast, or northwest. In summer they refuse to cross it because they can not endure heat, and in winter they simply do not cross it in numbers sufficient to make any appreciable difference in the herd. Those which do venture forth all too frequently become venison in a region where seasons are seldom closed air tight.

Other thoughtful persons suggested that the country to the north of the Grand Canyon was a land of genuine cowpunchers, and that these picturesque individuals might be persuaded to round up as many as five thousand deer, drive them down into the Grand Canyon, force them to swim the river, and then let them find their way to the South Rim where deer are as rare as they are plentiful on the Kaibab.

This idea appealed to certain people who had reason to believe that once the deer had reached the South Rim with its thousands of tourists and poor browse, they would make a neat line of tracks across the Coconino Plateau to the aspens of the San Franciscos and eventually

A JOVIAL YOUNGSTER

Rather proud of his new appendages, which are still in the velvet

become targets for the guns of Flagstaff and vicinity.

Anyone who had never seen a deer outside a zoo liked this idea. Those cowpunchers of northern Arizona and southern Utah could not be placed in that category by any stretch of the imagination, but they were, for the most part, willing and ready to meet their old friends on any pretense, and the "deer rodeo" had all the ear marks of a promising social event.

The following account of it was given to the author by a cowboy who claimed to have been there, but he has been called a cheerful liar by several persons who claim to know the exact truth of the matter.

The great day came, according to my wrangler, and the cowpunchers assembled. Zane Grey was there, looking for a story and some pictures to go with it. Everything went splendidly at the start, for the boys quickly rounded up a thousand deer or so, but when they attempted to drive them down to the river the fun began

CHOOSING

The fawns inspect both the sugary nibble of candy and the salt block, but are undecided

"right now". Eventually that cavalcade arrived beside the muddy Colorado, but they were concentrating their efforts on a single antique buck with a broken leg. The other 999 were holding a family reunion a mile above on the Kaibab.

As we have already pointed out, an open season for the hunting of bucks had been suggested. Hunting was to take place only on the overcrowded portions of the two winter ranges. It was believed that this would not affect the tameness of the deer in regions where tourist traffic is heavy, for the winter ranges are both considerably lower than the summer range. If private hunting did not prove to be an efficient check on the increase of the herd, it would be possible, the Biological Survey suggested, to employ official hunters to kill as many as five thousand deer annually to be sold for meat. Although this would have involved the construction of cold storage plants on the Kaibab, and the development of rather elaborate transportation and sales machinery, it was seriously considered as a desirable method to overcome the difficulties.

The use of surplus deer for restocking purposes was also suggested, but little hope for real relief from this source was held out because of difficulties involved in transportation. The nearest railroad is at Cedar City, Utah, a long day's journey for a pleasure car.

AN ASPEN GLADE

Through these groves in the Kaibab the mule deer roam, foraging for scanty food. Try to find some low foliage

My first visit to the "Land of Too Many Deer" was made in 1925, a year in which reports of one thousand deer being seen in a single evening were as common as aphids on a begonia. There were extremely conservative persons who estimated the herd at twenty thousand; Shiras had said thirty thousand to forty thousand in 1923. Although the spring and early summer had been dry, rains came the first week in July, and returned again in August and September. It was a sleek herd which departed for the winter ranges, for the rain brought food enough for all. Losses during the winter of 1924-5 were large among fawns and yearlings, but the winter of 1925-6 was less severe and the herd in much better shape.

Consequently the summer of 1926 found those reports of the previous year being continually eclipsed by the stories of breathless tourists who "stopped counting at 1200", or insisted they had seen at least a million. It is not strange that conservative estimates jumped to thirty thousand, thence to forty thousand and even to fifty thousand.

And what thrills those wide-eyed tourists enjoyed as they watched timid does or stalwart bucks peep with consuming curiosity from some sheltering tree or clump of brush, just as a bashful child used to be able to peek from the shelter of the maternal skirt! What surprises they had as they attempted to approach on foot, only to have the intended victim of their vest pocket cameras vanish into a leafy maze with a bound or two on long, frail legs which seemed grotesquely stiff.

Possibly it was then they discovered that whenever a poet sings of the graceful hind he is not thinking of a speeding mule deer, for these long eared creatures appear to be entirely mechanical when they are in a hurry, and are anything but the proverbial picture of grace which one is so apt to associate intimately with a deer in motion.

Returning to those estimates which we left jumping progressively higher, we find that organized sportsmen, having enjoyed their first open season, became so "alarmed" by these new estimates that they rushed to the authorities with the suggestion that each hunter should be allowed to kill three deer, regardless of sex, and pay a tax of $5.00 for each one.

Professional hunters have not been bothered by existing restrictions if they are all like one with whom I talked recently. He said that during the open season of 1926 he took a large party of sportsmen to the Kaibab to hunt. He killed a fine buck for himself, but before leaving he had killed eight others for members of his party who couldn't even shoot straight enough to kill a Kaibab buck. It is my personal opinion that almost anyone could hit one with a beanshooter, even during hunting season, by exercising a little patience and judgment.

During the summer of 1927 I was again on the

Kaibab. Although it was only August and early in the month, the deer were already plump, grass was abundant and there was little obvious evidence that there were ever too many deer in the region. The unusually heavy earlier precipitation had performed miracles. Yet there was not a day when we saw one thousand deer, or five hundred, or even two hundred and fifty.

If ninety percent of the fawns did starve or freeze, as some observers claim, then many older weaklings went with them, and Nature has thinned that herd as hunters never would have done it. It may be somewhat smaller than it was in 1926, but it is the sleek and the healthy,—the flower of the herd,—which have survived.

Because of the poor condition in which the deer were during the rutting season of 1926, the fawn crop of 1927 was smaller than normal,—a fortunate thing for the crowded Kaibab.

Temporarily, but only so, the problem has been solved, I believe. A hard winter, a short fawn crop, a hunting season, and then a rainy summer have been the chief factors. A good supply of food was assured for the winter that has just passed, so losses should have been small. The rutting season of 1927 found the herd in excellent condition, which means that the present fawn crop should be abnormally large. Another prosperous year or two and the herd will be larger than ever. Then what?

I doubt if anyone would care to see the day come when gaunt starvation will have to do its work again, yet unless some effective step is taken toward solving the difficulties confronting that great colony of mule deer, Nature will have to make the cruel history of the Jackson Hole elk repeat itself even more cruelly on the Kaibab in the not far distant future. A dry summer followed by a severe winter,—just that, and nothing more is needed to bring on a new catastrophe.

Slaughter by hunters is a little more merciful, but only a little. Still their work is far from satisfactory because they strive to kill only the finest of the herd,—those that are fat. Those are the very ones Nature has fitted to withstand severe winters and raise the general level of the herd. To destroy them is to cause the herd a great loss without assuring any compensating gain, for fat as well as forage is necessary if a deer is to survive a hard winter.

In 1927 hunters killed one thousand and one deer, but even if their suggestion that each be allowed to kill three instead of one were carried out, I believe that starvation and bitter cold would better do their work. Such a double slaughter probably would reduce the herd to numbers so small that there would be ample food, for a time at least, even in lean years.

Estimates by the Biological Survey state that a mountain lion kills two deer each week,—approximately one hundred each year. Despite the fact that deer are too abundant on the Kaibab, nine lions were killed in 1927, thus saving about nine hundred deer to help make a bad situation worse. I believe it is about time to establish a five year closed season on lions. Until man interfered the region of the Grand Canyon was the strongest of the puma's strongholds so there is little doubt that they could prosper there again.

Just how much good the lions would do as a check on the increasing herd is hard to determine. In 1910 the estimates showed that there were ten thousand deer on the Kaibab, You'll remember that "Uncle Jim" Owens said he killed 119 lions at approximately the same time. At one hundred deer each that would mean 111,900 deer annually for lion food!

Coyotes are thought to kill a great many deer, yet their slaughter continues. The same is true of bobcats. A slight increase in their ranks with a compensating decrease in the number of deer would be another drop in the bucket where the solution of the Kaibab situation is kept.

To supply food is impossible. To expect the deer to spread to new ranges is to be disappointed. To drive, or attempt to drive them to greener glades is folly. To allow sportsmen to kill anything which is fat is neither desirable nor pleasant to think about. To wait for starvation or pestilence to do their work is sickening to contemplate.

Our problem is exceedingly complex, but there must be a way out! I honestly believe there is a way out. To begin with we need a thorough investigation of the entire problem, not just a batch of estimates based on a ten-day tour of the summer range and a glance over the edge at the winter ranges. Such a thorough study is now being made of the elk in Montana and Wyoming, and it is being made by the United States Biological Survey.

Four governmental agencies are involved in the Kaibab problem. The State of Arizona, the National Parks Service, the Forest Service, and the Biological Survey. If anything really final is accomplished it will be because these numerous agencies pull wholeheartedly together. They all avow their willingness to do so. It seems obvious that the Biological Survey should undertake the necessary study of the situation, and outline the program for all to follow.

Meanwhile let us consider that the Kaibab Plateau is one of a very few spots in the United States where deer are too abundant. If the surplus could be distributed alive instead of dead, few there are who would regret it.

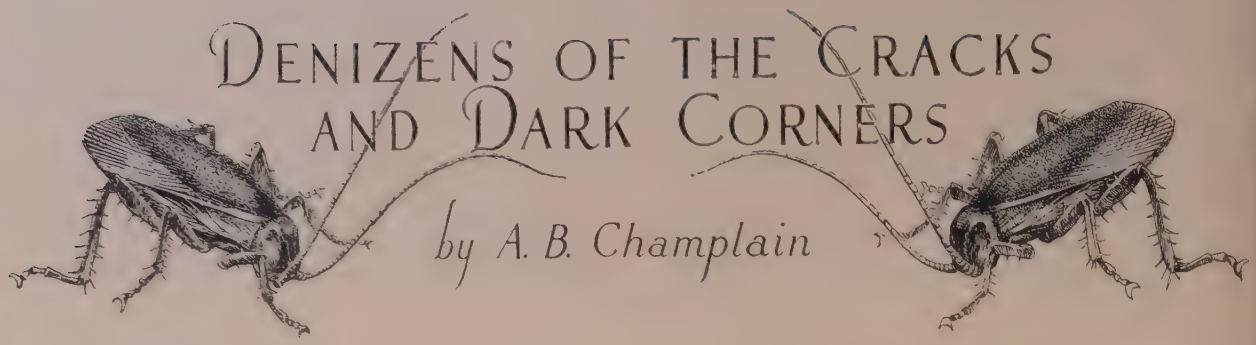
An adult deer is not to be trifled with, but why worry about adults? The fawns may be easily captured, readily adapt themselves to captivity, are not too difficult to raise, and at the age of three or four months can be shipped anywhere they might be welcome.

There is nothing new about this, for it has been tried in a small way in 1925, 1926 and 1927. Losses have varied with the intelligence of those who have cared for the fawns, but with what has already been learned it should not be a difficult matter to keep them below 25%.

Unfortunately the mule deer does not do well in the eastern half of the United States where the demand for more deer is greatest. However there is a lot of room in many parts of the West, including the State of Arizona. The great question is one of financing the distribution of the fawns once they have been obtained. But if that puzzle can be solved there is no reason why 2,000 fawns could not be distributed yearly to the great benefit of everyone concerned, including the Kaibab deer themselves.

Let hunting continue on its present scale, protect the lions and coyotes for a while, increase the work with fawns and at least we shall not be continuing to make a bad matter worse, until a thorough study has been made and, enlightened, we may be able to solve the problem.

Denizens of the Cracks and Dark Corners



by A. B. Champlain

A DARK form, one of those broad, flat-bodied, night-loving denizens of the cracks and corners appeared from a cranny in the wall. First a long pair of waving feelers, then the beast itself, somewhat uncertain in the flickering light of the fireplace. Another and another, until we become uneasy in this eerie company and flood the place with light. Scuttling swiftly away on rapid feet they all disappear into their holes and the darkness. If we manage to catch one, and hold our trophy up to the light, we find that it is only a cockroach.

This insect belongs to a large family, literally and scientifically and several kinds or species are well known in general as very disagreeable household pests. They are not at all pleasant to look at, these all-devouring, ill-scented, primitive creatures, and they excite our antipathy on account of the destruction and pollution they cause. Because of their agility and ability to run with great rapidity, many of us have not had a chance to observe them very closely. For those who are willing to take a chance we will present a few of them for a more or less critical examination, and also pry into the matter of their personal affairs and antecedents. With this knowledge gained we may become better able to combat and eradicate the pest that tests our patience when it gains access to our habitations.

THE WAY *in which Mr. Champlain's recent bedbug article was received suggests that this helpful story of the cockroach will meet with a similar response. Mr. Champlain is taking his place in the front rank of popular writers on insects and we have in store for you from him one of the finest bee articles we have ever read.*

Cockroaches are not usually discriminating in their choice of whose house they occupy, and most of them are willing to take "pot luck", although one species, it is said, prefers the dwellings of the better class of people. But in spite of their general plebeian tastes, they belong to a family of ancient lineage, and have been able to hold their own over a long period of time. The impressions of their wings and bodies have been found well preserved in the remains of the ancient forests and swamps that have been formed into coal and shale. With such tenacity of purpose it is easily assumed that they should have become associated with early barbarian man and made their home in his caves or huts. As man progressed, the roaches continued to live with him as unbidden guests, becoming more and more domesticated. Now, most of the domestic species are not found at all in the wild state, and have adapted themselves entirely to human's most modern dwellings. Factors in their persistence over so long a period of time are, no doubt, the light-hating habits of the insects and their swift mode of progression. In other words, they manage to hide themselves very easily. Since they have flat bodies and very compressible skins, they can squeeze themselves into the darkness and protection afforded by narrow cracks and crevices. This habit was probably acquired when in their wild state, at which time they lived under stones and beneath the bark of trees and logs. It certainly gave them a decided advantage when they became the unwelcome associates of man.

Today they are very common in many parts of the world. Tropical and sub-tropical forms have become scattered by commerce, while the domestic species are practically cosmopolitan in their distribution. These species thrive and multiply in the heat, moisture and comforts afforded by our modern dwellings. Being practically omnivorous they eat everything that comes in their way which is not too hard for their fleshy jaws. They live chiefly upon animal and vegetable refuse, and when present in numbers are among the worst of the insect pests affecting man. They inflict great losses upon merchants, as well as upon housekeepers, and leave defilement wherever they go. Their habit of discharging a dark colored, ill-smelling fluid from their mouth is one of the main reasons why they are so universally detested. The nauseous odor from the liquid affects the flavor of provisions with which it comes in contact, and even the cupboards or places the insects frequent retain the abominable odor.

In large cities they infest offices and public buildings,

THE ORIENTAL COCKROACH
Left to right, the female and the male, the former with the protruding egg case shown

and their presence in libraries denotes a taste for literature. They damage the books by eating the glue used in binding or the coating on the paper. In pantries and kitchens they dote on the crumbs that escape the broom, they get into the flour, investigate the open packages and cans, and fall into the cooking. They even loosen the paper on the walls by eating the paste from beneath it. It is said that in some warm countries they will bite the eyelashes off sleeping children.

WINGED ADULTS AND A NYMPH

These are about one-half actual size and collected in Panama, where they inhabit bat caves, not pantries

It is no secret that this ancient family of insects, the Blattidae—born "to damage," as the name derived from the Greek implies,—are all true Orthoptera, relatives of the crickets, grasshoppers, locusts and mantids. The name Cursoria, or runners, was given to the sub-order to which they belong, and of which they form the only family.

Generally speaking, roaches have a body that is broadly oval, flattened and flexible. The rings or segments of the abdomen overlap each other, and are capable of great extension and depression. The head is hidden under the front part of the body or prothorax, so that the mouth parts are directed backward and the eyes downward. The antennæ or feelers are many pointed, very long and delicate as threads. They are dark reddish—brown, yellowish or almost black in color. The males usually have two pairs of wings, the outer ones somewhat hard and the under ones membranous. Some of the females are wingless. They seldom use their wings, however, and prefer to trust to their nimble legs to escape pursuit.

Roaches have a peculiar method of egg-laying. They shut their eggs up in a sort of bean-shaped case or capsule, called the oötheca. This container is rather leathery and the mother roach carries it about with her, partly protruding from the end of her abdomen. When the eggs are nearly ready to hatch she hides them away in the cracks or corners. These capsules vary in the different species in size, shape and the number of eggs they contain, but they are all much alike in structure. Each one is divided lengthwise into two separate compartments by a membranous partition. In each compartment we find a single row of cylindrical pouches and within each pouch is an egg.

As soon as the eggs are hatched, the young roaches exude a fluid which loosens the cement that holds the

AND HERE IS OUR OWN AMERICAN COCKROACH

Though a native of tropical America it has been carried by commerce over the world. Left to right, adult with wings spread, in normal attitude and in the nymph or young stage

capsule together. The baby roaches then come into the world, white, wriggling creatures with all the external resemblance to their parents except for the wings. The color comes quickly after they leave the case, and after the fifth moult the wings appear.

There is no reason why one should suffer from such pests, as with a little trouble they may be kept under control. First, keep the rooms as dry as possible, for roaches need moisture. Then keep all paste, flour and crumbs swept up, so the pests cannot find anything to eat.

The simplest means of dealing with these insects is to dust with sodium fluoride, a white substance, similar in appearance to table salt, those places frequented by the roaches, such as cupboards, closets, corners in kitchens and pantries, behind steam and hot water pipes, and behind baseboards. This salt clings to the appendages of the roaches that travel over it, and in cleaning themselves the insects swallow enough of the poison to cause their death. It is well to remember and not get the sodium fluoride in food, or where it may be mistaken for table salt, as a large amount of it may be poisonous to human beings. Powdered boracic acid may be used in a similar manner if the sodium fluoride is not available.

A poison bait is recommended for the large roach by Prof. R. H. Pettit of Michigan, if the above remedy does not give the required results. Make a gruel of cotton-seed meal or of oatmeal and flour, sweetened with a little molasses. Cook this thoroughly, and when cool, add a cake of yeast to start fermentation. When fermentation is started, stir in a small quantity of powdered arsenate of lead, which is the poison that does the work. Place this bait in places where the roaches can reach it. If the bait dries out it looses its attractiveness to the roaches, and should be moistened every day or so to be useful.

The LOVERIDGE LAND-TURTLE

by Doris M. Cochran

Assistant Curator of the Division of Reptiles
United States National Museum

The most remarkable land-turtle in the world lives in the Dodoma country in British East Africa. The shell of this turtle, instead of being hard and semi-globular in shape like that of the rest of the land-turtles, is flattened out as if it had been pressed under a great weight and is likewise soft and springy to the touch. The reason for this strange condition arises out of the fact that these turtles for countless centuries have lived at the foot of a high granite precipice, and have sought protection from their enemies by pushing under the rocks scattered on the plain below, wherever the least crevice occurred. Once wedged in a fissure of the rocks the turtle is quite safe for no animal is clever enough to dislodge him, as he is able to inflate the body slightly, and the shell, being soft on top and bottom, is actually expanded to a slight degree to fit the crevice. When he is hungry, the turtle has but to crawl a little way from his boulder home to feed upon the juicy African grass which covers the plain.

THE LOVERIDGE SOFT-SHELLED LAND TURTLE
Drawing of these curious reptiles from the proceedings of the Zoological Society of London, 1922

The Loveridge turtle lays eggs just as other land-turtles do. When the young turtle is newly hatched, it has a complete bony shell very much like the other land-turtles, but as it grows older the ribs and vertebrae become softer and softer instead of solidifying, so that when the turtle is fully grown, only the bones of the legs, the head and the extreme outer rim of the shell remain ossified.

Some of these turtles were kept in captivity by their discoverer, Mr. Arthur Loveridge, who found that "at night they always retired beneath the heaps of stones and boulders provided for them, and there they piled themselves up, one atop of another, a great deal of noise being caused by the scratching of claws on shells. They did not again make an appearance until several hours after daybreak, which varied according to the dullness or brightness of the morning. It was obvious that in their soft shells these turtles would fall an easy prey to the carnivores roaming about after nightfall, and which are very plentiful in the Dodoma district. The soft tortoise shows a fondness for climbing up and falling off the rockeries of its enclosure, which pastime, indulged in its natural habitat, calls for a rapid recovery in turning over; it also displays great agility in climbing up wire netting. One day eight specimens of the soft tortoise succeeded in escaping through a hole in the wire netting. They feed well on a succulent grass; the previous specimens taken home were fed on lettuce, and when this failed were induced to eat bread soaked in jam."

A PICTURE OF ANGULAR GRACE
Each dark blue-green feather of the head and back was etched in spider webs of gold in the sunset's rays

CORAX, *the* NIGHT HERON

His Broken Wing and Rapier Beak Kept a Household Alert

by Lorene Squire

Photographs by the Author

HARRIS was more disheveled, even, than is the usual habit of small brothers. Bob, his chum, was positively gory.

"Just what," I gasped, "has happened"?

"A bird! A different bird! A man shot him in the wing and brought him to you and so we bandaged—"

"Where is it"?

"In a box in the garden".

There it was,—a strange phantasy and a night heron. His large ruby eyes centered with jet were as beautiful and just as expressive as the immense, rounded jewels might be. In the dim light of the corner where he crouched he seemed merely black and white. All about were gray feathers cut from the pearl gray wing.

"He's a black-crowned night heron", I explained.

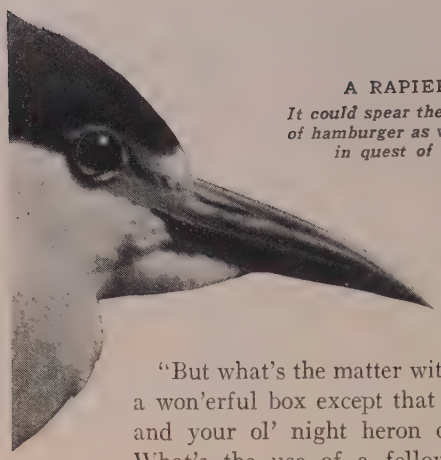
"He's murderous", snorted Harris; "look where he pecked us".

"Speared", corrected Bob. "But you should have seen him run. He got away from that man and away he went on those long legs down the pavement. A dog caught up with him and,—gee, how he pecked that dog. I s'pose the poor pup is still a-howling and running".

"Bob caught him," proceeded Harris, "and Bob got pecked and let him go. When he caught him again he held him way out for safety first. We thought that the broken wing would be a won'erful opportunity to practise Boy Scout first aid. But we couldn't do it very good 'cause we had to hold the heron's well wing and his neck 'specially and his feet and then he sure speared us. Then we had to find this box".

"I object to this box", I murmured weakly.

Bob dropped the adhesive tape, the iodine, the first aid book and the scissors. Harris's freckled countenance showed great concern.



A RAPIER BEAK

It could spear the hand in search of hamburger as well as the lake in quest of a minnow

"But what's the matter with this box? It's a won'erful box except that it's a little low and your ol' night heron can't stand up. What's the use of a fellow working and getting speared if he has a sister—"

"All right. I expect it will do until it's time to let the night heron loose".

And so it was that the next morning the night heron, duly christened Corax, was let loose in our garden. I followed his long-legged steps from the lettuce bed, past the great orange poppies, on into the orchard. There was a stateliness about Corax. The angular grace of all herons was upon him.

Corax, beside his grace of form and line, held beauty in his feathers,—such beauty that it was enough to make as hardened a bird enthusiast as I exclaim in wonder. The white feathers of the throat and breast were thick and soft, a joy to drift one's hands upon. Back from the head extended three long feathers, their fine filaments wrapped around to make three white cords. These were usually joined into one except when the whipping wind separated them. This long fairy-light cord gave a curve to the night heron's many angles.

The feathers of the head and back, long and lacy like peacock plumes, held a deep green-blue, the color I have seen in darkest paintings of the sea. The sun brought to them a hint of bronze, glinting and going, etching each green-blue feather in spider webs of gold.

Corax ran in and out between the peach trees, his neck moving in rhythm to his steps. Finally his gait slowed to a dignified walk. With a great deal of flapping he reached one foot to a lower tree branch, and pulled himself up, as a parrot might, with his beak. Quickly he gained the top branches.

I went away in deep thought. What to feed this heron? I decided on raw hamburger. So, in the afternoon, I climbed up to Corax, who threateningly squawked, mounted higher and thrust down with his dull black bill. I offered a bit of the meat. Corax savagely stabbed down getting a bite of the meat and of me. Swiftly he dashed the meat from his bill and speared down again. This time he took none of the meat but quite a piece of my hand. I retreated down the tree.

The next evening Harris and Bob came home sunburned and very wet, but with a bucket of minnows for Corax. I held up to him a flopping shiner. He ignored this and stabbed my hand. So, finally, with great bravery and much more fear I carried the night heron down from his tree and held him above the pan of minnows. He merely squawked and struggled.

"Dad", I shouted, "Oh, Dad Please come here".

After a wait Dad appeared, a martyr in anticipation of the worst.

"What is it now"? he demanded.

"It's a bird".

"I knew it. I knew it".

"I want you to put minnows down this bird's beak while I hold him".

"I have never put minnows down a heron's beak and I do not expect to". He was ready to explode.

"But Dad—"

"It's no use I object".

"Can't you see, he'll starve"?

"Well, perhaps we could arrange a compromise. I'll hold,—what is it"?

"Corax, a black-crowned night heron. Corax is taken from his scientific name *Nycticorax naevius*".

"All right. All right. I shall hold this bird while you deliver the minnows".

Dad put a cautious hand over the heron's well wing and then lightly at the base of his throat. I selected an active silver minnow, opened Corax's beak and thrust the tiny fish down. Corax made no movement. Another minnow and then another until, to Dad's delight, I had thrust down seven.

"Now," said Dad, "why don't you try that pollywog"?

I did. It was too much for Corax. With an impatient flip he cast all seven minnows and the pollywog upon the ground. There was a pouch beneath his bill where he had been holding them.

"I resign", groaned Dad.

PLAYING HIDE AND SEEK

Corax was a phantasy in the garden, resentful of the attempts to feed him by force

The night heron seemed to float away carrying his strange fantastic grace into the dusk.

Finally I learned how to feed Corax. I held him and thrust hamburger down his beak. Then I set him back in the tree and after due thought and consideration he deigned to swallow the meat.

One day the man who came to spray our orchard had the fright of his life. All unexpected, from the shadows of a tree, two ruby eyes glared down at him. A long black bill lunged suddenly forth and, then, a terrible squawk. The man never returned. Dad finally had to do the work of spraying so he yet holds a gloomy grudge against night herons.

Corax hated me though I fed him and gave him water. Changeless he was, forever frightened and wild. I respected this. He was away from the great catalpa grove where for the last three years herons had come to build their nests, he was away from the river and the pond nearby. No more the sunset sky above the catalpas for him or the gray strides of his wings in the dawn. There remained patient, well fed days in the branches of our fruit trees. In his heron way he must have been unhappy.

It was during one of these gloomy periods that Corax caused a crisis in my life. He and Katy, the cook.

Katy is a good cook, and her Irish heart is as large as her buxom frame. But she has one fault in common with the rest of my long-suffering family,—she does not like my pets. Perhaps her instinctive hatred was a throwback from the dim days when St. Patrick fought his reptiles. If so, it has grown with the years.

But her hatred continually has to struggle with her natural good-heartedness, and many's the time I have caught her feeding one of the animals which had been incarcerated in "solitary" for mayhem on furniture, while at the same time exorcising him with vigorous Irish vocabulary. And because Corax did not come into her kitchen or touch her rolls, she had respect for him.

For several days he had not eaten,—lonely and grim he seemed. And Katy's heart swelled with its soft sentimentality to see from her window the quiet, savage, friendless, hungry little heron silhouetted against the blaze of the setting sun. To her he was pathetic.

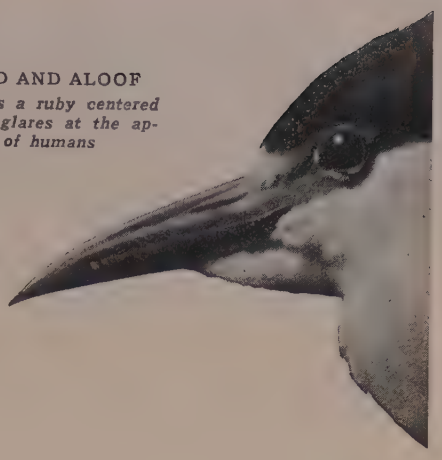
One morning early, I was awakened by a scraping sound in the gravel, and looked out to see Katy dragging a heavy ladder to a fruit tree on which Corax, still asleep, was perched. She started to climb up, holding in her hand a choice piece of liver.

"Pore creathure! And 'tis half-starved ye are".

Corax woke. Corax eyed the approaching cook, her face beaming with her magnanimity. Corax acted. . . .

Neighbors heard the shrieks, delivered in a rusty soprano, but only I saw Katy back down,—and oh, so slowly back down,—her ladder, and only I heard her Irish imprecations while Corax continued to peck. Oh, ingratitude! Oh, abused confidence!

Katy was a good cook, and as good cooks go, she went, following such base treachery to a noble purpose. Vainly I pointed out Corax' poor home training. Vainly Dad talked of baked ham. It was only after two days of misery,—for the family, as usual, blamed me,—that a long prayerful letter from Dad, asking who could cook sweet potatoes as she, brought her back again.



DIGNIFIED AND ALOOF

Corax's eye is a ruby centered with jet and glares at the approach of humans

For a week more Corax stayed in our garden,—a motionless, silent phantasy. Then again he was gone.

"I have something important to show you", announced Harris one May evening. "Won'erful important".

Breathlessly I hurried into the car. At a little pond by the road, a mile from town we stopped.

"Now look", Harris ordered in triumph.

I did. It was dusk. A wind shivered the grass-grown pond surface. At last I saw. Standing in the shallow water was my night heron, one wing bandaged.

Thus I knew that Corax had escaped in some miraculous way from the seeing eyes of the town. Walking across fields he had found the nearest water. There he stood, and as I watched the rapier motion of the bill I knew for certain that Corax had his minnow.

"Kansas Weeds" is the title given to this picture by its subject, Miss Lorene Squire, known to readers of "Nature Magazine" for her human-interest Nature stories. Like Kansas weeds, but with a much more delightful effect, Miss Squire, now a mature person of nineteen, has grown rapidly during her three years of writing. She is concise in autobiography —"I was born in Kansas and am here yet. I went to Kansas University. I have never seen a mountain. I have never seen the sea. But I have looked upon a tawny coyote trotting across a dry creek bed. I have seen the white gulls following the farmer's plow in the spring. My ambition is to write some day as did John Muir. Perhaps it is hopeless."

Frankly, we don't think so.

FIRST PRIZE

"Four Wise Chaps"

WALKER E. McBATH
Washington, D. C.

THIRD PRIZE

"Mother Kingbird Broods Her Young"

LEWIS J. MERWIN
Negaunee, Mich.

JUDGING a photographic contest is not a simple task, particularly when such fine pictures are submitted. Some good entries must be eliminated, of course, but there is no rule against their being again entered in the contest. Contestants are again reminded of the offer of the Folmer-Graflex Corporation to double the first prize when the winning picture was taken with a Graflex camera. Be sure and note this on your entries. Do not forget, either, the special Outdoor Good Manners and Garden Photographic Contests. Send for an announcement.

HONORABLE MENTION

"Otters" C. H. BROWN, Edgewood, Md.
"Acrobatics" A. KEMPIN, Sterling, Kansas
"Black and White" GLENN C. GILLESPIE, Pontiac, Michigan

SECOND PRIZE

"Along the River Bank"

ALICE B. ROBINSON
New Smyrna, Florida

THIRD PRIZE

"The Road to the Mountains"

DR. B. J. OCHSNER
Durango, Colorado

THIRD PRIZE

"A Forest Idyll"

MRS. GEORGE SYNOGROUND
Jud, North Dakota

HONORABLE MENTION

"Marten with Dinner"

W. M. ROSEN, Ogden, Iowa

HONORABLE MENTION

"The Choir Leader"

ROLLIN F. CASS
Dunkirk, New York

Another of Mr. Haweis' entertaining stories of the Smithsonian-Chrysler Expedition to Africa in behalf of the National Zoological Park.

EXPLORATION IN THE STOKE-HOLE

Not exactly an appropriate place for the rambles of a wart-hog, as this fellow himself would testify

"PIGS *is* PIGS"

Wherein a Wart-hog Explores the Stoke-Hole

by Stephen Haweis

Illustrated by the Author

THE ESTIMABLE Dr. Watts who wrote the inspired dictum that "birds in their little nests agree," was very far from the truth. Most little birds are very quarrelsome, both in their little nests, where their sole preoccupation is to get more food than the others, and everywhere else. Very many little sweeties are as mean as they can be and their tempers are as sharp as their noses. Now if the great man had based his hymn on the behavior of pigs, his moral would have been just as good and his natural history better, but somehow one couldn't sing a hymn about pigs! Christians eat them but they don't make a song about it. Mohammedans however, say the pig is unclean,—without exaggerating,—and to eat pig would be, for them, defilement unthinkable. They won't so much as touch a pig and the very idea fills them with disgust. But pigs are fine creatures, friendly and even affectionate when well treated. Baby pigs are the most engaging pets. They are all most sociably inclined and, if pigs might fly, they might build nests; and if they built nests they would certainly agree in them. They would lie contentedly in a heap, side by side, or one on top of the other, and agreement can go no further than that.

GREAT CURLY TUSKS

This equipment of the wart-hog resembles well-trained moustaches

Civilized pigs have only one ambition. It is to eat so much that they will become round enough to bowl along. They may never quite realize that ambition, but who of us does realize his secret ambition? They do their best and, like all fat people, are apt to be amiable, —especially after dinner. But, personally, I do not think obesity is admirable, and the pig has only developed this ideal of fatness under great temptation and human guidance. Wild pigs are never too fat. They must be thin enough to run, or something will certainly catch and eat them. Some pigs, peccaries for example, are splendid runners. They run in herds and will run down anything on two feet or four. They can jog-trot forever, and they will trot until their prey gives up and consents to be eaten peacefully. The wild boar is a fierce fighter and has strong tusks with which he often kills the large hounds that are used to hunt him, but the pig which has the largest tusks is the African wart-hog,—great curly tusks much like a well-trained moustache.

The wart-hogs live in holes in the ground and are sometimes hunted with a spear by those who like risking their lives and are tired of dodging taxicabs. But we tried to catch them alive. This is done with nets. The nets are very large and strong, of course, and they are staked out on strong poles. Natives were stationed at intervals along the nets and others helped to drive the animals into them. While the wart-hog is butting at the nets, somebody has to catch him and rope him until he can be got into a cage. Pigs resent being caught and tied up and they do everything they can think of to make the job as unpleasant as possible. Their long tusks help them to defend their liberty; with quick slashes they rip up whatever flesh they strike, the enormous head and shoulders giving them power to do great damage.

But at last our efforts were rewarded and four found their way into one of our cages, where they soon settled down apparently satisfied that the game was up and, since the food was aplenty, there was not too much to grumble about. All day long they slept in a stuffy heap and at night woke up to eat vast quantities of sweet potato and squash, of which they are particularly fond.

They had not given up all hope of getting out though. Pigly council was held daily and the question of getting out and going home was discussed from every angle . . . chiefly the four angles of the cage that held them fast.

"There is only one chance," said the biggest of the pigs, "we must get out when the door is opened. It is always opened once a day . . ."

A FIERCE FIGHTER WHEN CORNERED

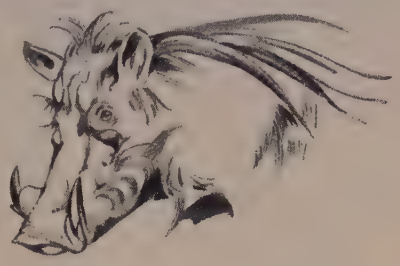
His efficient tusks will gore in any direction and, unlike civilized pigs, the wart-hog keeps thin to run

"Sometimes twice, . . ." put in the littlest of all.

"None of us is infallible," said the big fellow snuffily, "not even the smallest of us. I accept your correction 'sometimes twice,' . . . but you can't get out twice, so when the door is opened *once* is when I propose to get out".

The little pig felt very much ashamed at being snubbed like that and he put his face down flat, as flat on the floor as he could. And all the others sat on him . . . and when I say sat on him, I mean just exactly that. If the first that sat on him had been ever so little fatter he wouldn't have been able to breathe; he didn't do much of that as it was, but he did not dare to lift up his voice a second time while the council was going on.

"And then we'll bolt for the thickest part of the bush, each in a different direction, and lie still until the men have gone away".



IN SPECULATIVE MOOD

Mayhap ruminating on escaping into the bush if chance offers

The plan worked perfectly. The door opened and half a squash came in, after which four pigs came out and the astonished boy who was doing the feeding sat down hard and suddenly into a pail of water behind him. So far, so good, but the wart-hogs looked about in vain for thick and friendly bushes. There were none, because bushes almost never grow on the deck of a steamer. The hogs galloped in every direction, their pointed hoofs sliding on the smooth wet wood. They did not know that they had been at sea for a week and were over a thousand miles from the nearest bush of any sort whatever. They were terrified and the two littlest dashed back into their cage.

It was the best-looking place they could see. The third needed very little more persuasion and a moment later was panting and puffing in his own stateroom. He huffed and he puffed, but the house was uninjured, and the door was shut.

But what happened to Pa? He was as bewildered as the others, and just as frightened, but he couldn't bear to go straight back into the cage. The others wouldn't exactly have laughed at him, because his tusks were the largest, but when he lay down upon them there would have been a distinct shaky feeling noticeable which his sensitive mind would correctly interpret as suppressed laughter. He couldn't bear that, so he dashed for the darkest place he could see, which happened to be the passage beside the engine room, and took refuge behind an iron wheel barrow at the far end of it.

"Now," said we, "we'll just back another cage opposite the entrance of the passage; post somebody at the fire room companionway . . . prevent him going in there at all costs. Then he'll run back down the corridor into the cage".

But he didn't! He dashed towards the light, not even noticing the bang on the nose from an iron fire rake which greeted him at the doorway, and then he found himself upon a floor of steel bars, two inches apart upon which he could not stand for two seconds together. He floundered towards the ladder and fell twenty feet, . . . got up, . . . and fell down twenty feet more . . . staggered up and fell the last fifteen among the three Hindoos who were innocently stoking the furnaces.

"Is he dead"? shouted the Doctor, peering down from the top railing.

There was a moment's silence while the Hindoos sought among themselves for English words. They had left the fires at once and were hanging to the gratings above their heads, leaving the hog and his defilement to the floor.

Then a weak voice came up from the depths below: "He hass come"! Probably a very poor translation of what it was in his mind to say; his emotions were tremendous but his English very limited.

And Pa pig ramped up and down the fireroom, dodging and charging, but more in sorrow than in anger. He didn't want to hurt anybody but he did want to find a bush, a hole or a bush, in which to lie still until the men had gone away. The men however had a large sack which they intended to throw over the pig's head. It was not necessary. As soon as the sack was opened it looked like a hole, a large dark hole, and Pa pig bolted into it and was carried struggling through the narrow passage to the engine room, up three narrow steel ladders and out into the light of day. He was put back into his cage with hardly a scratch! He had made a good try for liberty, but found he had no real vocation for the sea. It was his last attempt and the story, as he told it to the others was so terrible that they didn't crack a smile. They were glad the hero had escaped with his life. Nobody thought he would!

The RUFFED GROUSE DRUMS

He Sounds A Rapid Tattoo To Please His Lady Friend

by
Wm. E. Sherwood

(Photograph by the Author)

ZOOM! ZOOM!
He ruffles and flares his feathers, and beats his wings against his flanks

PERHAPS, when in the silence of the deep woods, you have heard the hollow "drumming" of the ruffed grouse, and wondered how it is done. This performance, so often heard, yet seldom seen, is accomplished in the following manner:

Standing well forward on the side of his drumming log, with tail braced on the top of the log to give better support, he repeatedly spreads his wings and brings them down forcibly against his sides. The first two or three strokes are deliberate, and the wings are brought almost to normal position. These first strokes make very little noise and are probably a "limbering up" process for what is to follow.

Then, after a slight pause, he ruffles up his feathers and gets down to business. He now uses only the secondary portions of his wings, but these are brought down with tremendous force against his flanks, thus making the hollow booming sound, which is probably augmented by air rushing out from between the wings and the body. Between the strokes the primary feathers flare out conspicuously.

He gradually speeds up until the blows are almost indistinguishable from each other and you almost wonder that he does not rise from the log by the very force of his wings against the air. Finally, utterly exhausted, he ceases with a half-hearted stroke or two and stands like a statue for several minutes before repeating the performance.

The drumming begins at earliest dawn, and, except for a few hours during the heat of the day, may continue till the last trace of twilight has faded. If there is a bright moon he may drum at any hour during the night. It is his way of making a good impression on his lady friend, which may account for the effort used.

Another article in the helpful series of garden articles specially written for the Nature lover as well as the amateur gardener

"KING OF FLOWERS"
The peony lends itself to mass planting and is extremely valuable to one in planning the home landscaping

COURTESY SCHENLEY GARDENS

PEONY
the Flower Beautiful

by Dorothy E. Pletcher

UNTIL fairly recent years, the peony has had scant recognition. Now, its popularity, which may be seen in the present demand for fine peonies, is increasing tremendously for this poignantly beautiful flower is fast overshadowing many of its lovely contemporaries, causing them to hang their heads in chagrin.

The "King of Flowers", as the ancients called it, never fails to make an eloquent appeal to all who enjoy flowers and gardens. Its maze of dazzling colors and widely differing types of blooms, together with the dark green foliage, often tinged with red, present a scene of never-failing loveliness and provide innumerable suggestions concerning its use for landscaping and cut flowers. From the imposing array of herbaceous plants, it is difficult to find one that is as adaptable as this flower, to any position in the garden or grounds. When we consider the facts that a peony of good variety, well planted, will steadily increase in beauty and value for years, that it grows easily, and provides the garden in May and June with gorgeous blooms and singularly attractive foliage until frost, it is not difficult to see that one of the safest garden investments that can be made is the purchase of several of these plants.

Then too, its extraordinary hardiness and permanence are unparalleled. With gay defiance of harsh weather it thrives in both north and south, but with heightened charm in cold climates, making it possible for one with a fertile fancy to go endlessly into the realm of the beautiful in raising this hardy flower, so delightfully sweet-scented that it comes dangerously near challenging the rose for its supremacy in loveliness of perfume. Truly, it is a far cry from the old-fashioned red, unscented peonies of our grandmothers' time to the many-colored, exotic blooms of today.

There is rather an interesting little story concerning the origin of the name "Peony". Countless years ago, in fact, back in the days of the Greek gods and goddesses, the peony first came to the world's attention. It is said that Leto, Apollo's mother, was the one to introduce it. Apollo was known as the god of healing and his son, Aesculapius, was the god of medicine. It seems that a pupil of Aesculapius named Paeon was the physician of the gods, and to him Leto first gave the plant which he employed to cure Pluto of a wound received at the hands of Hercules during the Trojan War. The fact that his pupil could surpass him in effecting such a cure made Aesculapius exceedingly angry, with the result that he attempted to kill Paeon, but Pluto, indebted to Paeon for his own life, rescued the physician of Mount Olympus from death by changing him into the plant that had saved his life. Until this day that plant bears Paeon's name and is known to us as the peony.

The history of the peony in China and Japan is of a sentimental nature. Fittingly enough, the words "Sho Yo", meaning "Most Beautiful", were applied to the herbaceous peony, while the tree peony held sway as the "King of Flowers". It was a quaintly characteristic custom to present "Sho Yo" to a friend when parting. In the sixth century we find that the Chinese used the plant for food and medicinal purposes as well. It was not until the eleventh century that its ornamental value was discovered and people began to cultivate it

COURTESY THE PFEIFFER NURSERY

LUETTA PFEIFFER, A SEMI-DOUBLE

This attractive peony is given a rating of 8.7 by the American Peony Society, which speaks volumes for it

for its flowers. The peonies which the Chinese exported to France in the nineteenth century formed the nucleus of the famous French collections which have so thoroughly enriched peony culture for the entire world. Japan, likewise, received her peonies from China, when, in the eighth century both the herbaceous and the tree peonies were sent to her. The peonies which Japan exports almost exclusively now are known as Japanese, being a variety between the single and the double types.

England has made many early literary contributions to the fame of our flower, but it is to France that we must give thanks for the contribution of some of the very finest specimens we now have. French hybridizers have been indefatigable in their efforts to enrich the peony world with new and increasingly beautiful blooms. The name of Victor Lemoine stands out luminously in the history of this work for his flowers are of exceedingly rare beauty.

In this country the peony did not make its appearance in literature much before the beginning of the nineteenth century and it was not until approximately fifty years later that it was noticed to any extent. Many growers were continually trying their hand at producing new sorts until the staggering number of various types became confusing. In 1902 the American Peony Society was formed and came to the rescue of amateur peony growers by studying and classifying the numerous varieties. Their classification is described in one of their bulletins in this manner: "The voting was upon a scale of ten, in which a grade of ten represented the highest excellence, nine high quality, though not the highest, seven to eight fairly good quality, and anything below five a kind not worth cultivating". All commercial peony growers grade their stock according to this standard and publish the society's estimate of every bloom in their catalogues.

Manifestly the array of widely diverse types of peonies is confusing to the amateur peony grower, for the ramifications of this flower family are many. In general, there are two main varieties,—the herbaceous type and the tree type. The former dies down at the end of its blooming season and reappears in the spring, while the tree peony, due to its woody stems, refuses to die down to the ground in the fall. Its leaves are of a paler shade of green than the herbaceous type and its flowers are much larger. It is most extensively cultivated in the Orient. Although there are a number of worthy species in the herbaceous family, the majority of our valuable hybrids come from the "officinalis" and the "albiflora" groups, our most divertingly beautiful blooms being traced to "albiflora".

ALONG THE GARDEN WALK

The peony is an admirable flower for this type of treatment, making lovely borders

COURTESY MOHICAN PEONY GARDENS

The herbaceous peony, in its evolution from the single variety, has accumulated certain types which are known as single, Japanese, anemone, semi-double, crown, bomb, semi-rose and rose, which completes the doubling of the series. The names alone in this classification serve sufficiently as their description.

For the most effective use of one's space, it is best to plan the garden far in advance, with an eye to harmony in colors, types and sizes of peonies. Consider varieties for cutting, for landscaping and for sheer beauty of detail in the individual flowers, because selecting varieties and colors at random and without a definite purpose in mind would present an absurd picture of aimless confusion, a veritable patchwork-quilt effect.

COURTESY J. K. ALEXANDER

A CLUSTER OF SINGLE PEONIES

The singles are not only artistic and brilliant in color but always stand erect in the garden

In choosing plants from the long list of those available for use in the garden and around the home, it is well to ponder over the question of how to make the period of bloom as long as possible. If one plans his cherished garden thoughtfully, he will see to it that his peonies bloom continuously for six or seven weeks; he will also insist upon having an artful adaptation of types to his garden. The confirmed flower lover plans his garden with finished artistry, and due to the skill of those hybridizers whose excessive zeal for raising peonies has given us specimens far beyond the average dream of splendor he has an unbelievably rich display from which to pick his favorites.

Prices of peony roots are most capricious, ranging from fifty cents to fifty dollars a root. The peony amateur will doubtless want to experiment at first on the less expensive varieties temporarily, leaving the costly flowers to the connoisseur. For the amateur's peony garden of six weeks' uninterrupted bloom, I am including a list of inexpensive varieties. I have selected two of the early mid-season, and late specimens blooming, respectively, trying to cover the range of colors by choosing from the white and light colors, pink and medium colors and the reds. With the exception of the two early-blooming red peonies, Philippe Rivoire, which usually costs twelve dollars a root, and Adolph Rousseau, generally priced at a dollar and a half, nothing in the list exceeds a dollar, and several are only half that amount.

The white and light colors for early blooming are Festiva Maxima and Duchesse de Nemours; mid-season, Avalanche and Mme. Crousse; late blooming, Couronne d'Or and Marie Lemoine. The pink and medium colors for early blooming are Eugenie Verdier and Edulis Superba; mid-season, Asa Gray and La Perle;

PEONIES HELPFUL HERE

The mass of these flowers make them useful for such plantings as here pictured

COURTESY MOHICAN PEONY GARDENS

late, Marguerite Gerard and Albert Crousse. The red and dark colors for early blooming are Adolph Rousseau and Philippe Rivoire; mid-season, Karl Rosenfield and Edouard Andre; late, Delachei and Felix Crousse.

Peonies, with their wealth of color and large blooms, readily answer the requirements of the ideal cut flower. Color comes first in the choice of the peony, but it might be well to take into account the fact that color at times varies considerably with the age and strength of the plants. Then too, the light-colored and delicately-tinted blooms, unless protected from the sun, fade and are far less attractive when the fragile shades of flesh, lavender and lilac are lost. That one may enjoy to the fullest extent the gorgeousness of perfect blooms, he should cut his peonies when the buds are about half open,—when he is able to see what color the flower will be,—and allow them to open in the dark or shade indoors. After cutting the stem, place it immediately in cold water; and do be sure to leave enough foliage on every plant to insure you flowers for the next year.

Naturally enough, for cut flowers we want the loveliest varieties,—those noted for their beauty of detail,—and in this category we have Le Cygne (white), whose rating of 9.9 is the highest bestowed by the American Peony Society; Kelway's Glorious, white and very fragrant; So-

COURTESY BRAND PEONY FARMS

A BEAUTIFUL GROUP

In planting peonies proper shade and soil should be carefully considered

COURTESY BRAND PEONY FARMS

LOVELY VASE-FUL

The single varieties are exceptionally well-fitted for growing in rock gardens and under large trees

lange, lovely but blooming only once in four years in some climates; Milton Hill, Mrs. Edward Harding, Frances Willard, Madame Juliette Dessert, and Walter Faxon, the ideal cut flower which lasts for a number of days. These are merely a few of the costly and precious sort. Should one be partial to fragrant varieties, Philomele, which has the luscious odor of the mock orange, Duchesse de Nemours and Kelway's Glorious would gladden any heart.

First among the perennials stands the peony for delightful masses of color. Our peony is peculiarly adapted for massing beds, and valuable for planting in groups throughout the perennial or shrubbery border, because of its decorative foliage and brilliancy when in bloom. There is not a time in the growing season that the plant will look unsightly. If a striking picture is wanted, mass the peonies on the lawn with a background of trees, making the latter serve the twofold purpose of a shelter for the flowers and a means of showing off their bright colors. A drab-looking city lot may be transformed into a bewitchingly pretty picture by means of mass planting in corners and around the sides. For this, have solid masses of reds in the corners, shading them back to whites in the border; or start with pale pinks, grading them off through shell pinks to white. By using the cut flower varieties of moderate price, mass planting may be made with small expenditure.

Another pleasing scheme is the lining of walks with gay peonies, while their use in accenting the plan of the formal garden is a common one. Many lovely borders have been made with the Lord Kitchener variety, which

MARIE JACQUIN

(Below) A single peony that becomes semi-double as it grows older and stronger

COURTESY PUGET SOUND PEONY GARDENS

boasts an abundantly blooming red flower with interesting foliage. Augustin d'Hour, another sort for this manner of planting, is slightly taller than Lord Kitchener and has a tint of blue in its red bloom. Widely different from its relatives is the dwarf peony, Octavie Demay, with its hydrangea-pink blooms, one of the earliest peonies out to greet the opening of the flowering season with a debonair sprightliness.

The advocates of single peonies claim for them an inherent charm in landscape use, for in addition to their artistic appearance and brilliant coloring, their lovely goblets are always held erect, and they are singularly picturesque by the water side. L'Etincelante, a carmen product of this collection, is one of the outstanding landscape members, because of its unusual carrying qualities with stems which make it impervious to dashing rains. As this species is native to rocky places, it is exceptionally fitting for the rock garden; and grows well under large trees.

When looking for a location in which to plant, we must remember that the essential requirements for successful peony culture are good drainage and partial shade, the latter so that the flowers will not fade as much as they would otherwise. Various horticulturists have stressed the value of using peach trees as protection for peonies. It is claimed that the roots of this tree are not very large and do not absorb as much moisture from the ground as other types of trees; therefore, the peonies utilize the peach trees' shade and are not robbed of all their ground nourishment. With the trees planted about thirty feet apart each way, the peonies receive just the right amount of sunshine and shade.

Concerning the ideal soil, the consensus of opinion seems to favor a clay loam, which, of course, has been enriched. Sufficient lime to sweeten the soil, some hard-coal ashes for softening the clay, and a portion of humus or decayed vegetable matter for richness form the ingredients in improving the ground for the peony beds. It is possible to make the soil too rich for success.

Several months before time for planting peony roots, prepare the ground for them. If they are to be planted in a row, dig a ditch two, preferably three, feet deep, and plan to space the flowers four feet apart. This allows for the spreading of the roots as they grow larger. If one is enthusiastic in this project, he will want to give his flowers every chance to succeed; hence, the ditch should be refilled with top soil and well-rotted compost which has been thoroughly mixed. According to one successful peony grower, a proportion of one part compost to nine parts of top soil is the ideal arrangement. When refilling the ditch, the fact that the ground will settle should be taken into account, and to meet this contingency, the soil ought to be well heaped up beyond the ground level. In no event plant peonies in soil where some have previously grown.

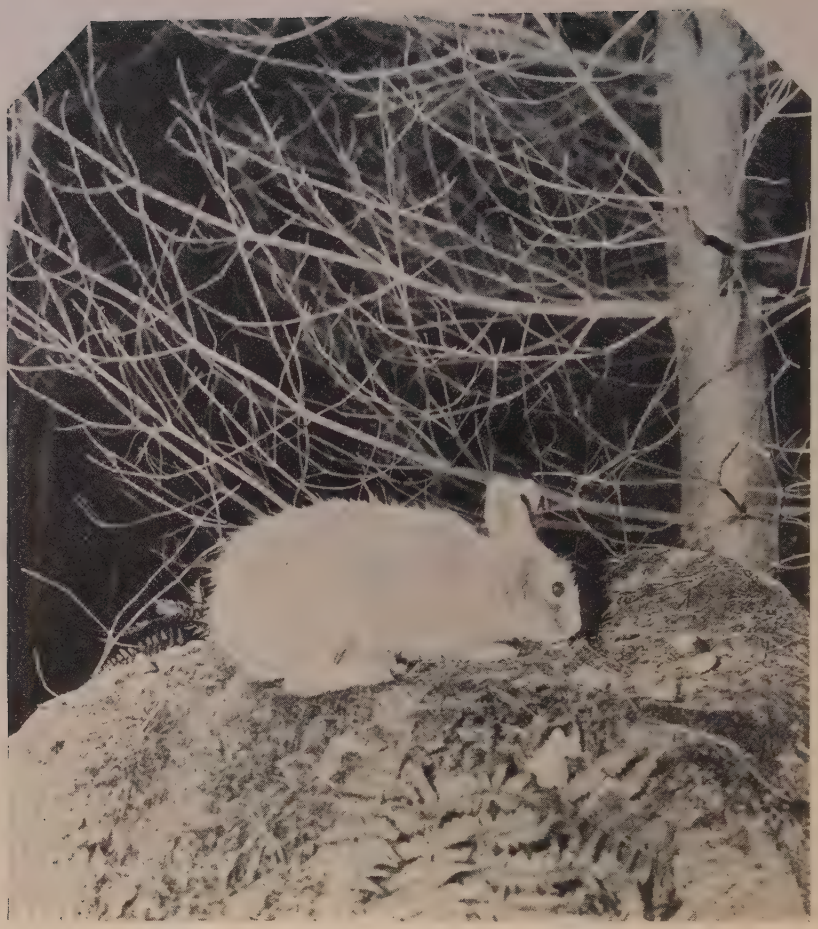
The middle of September is the correct time for planting, and wise is the gardener who selects a permanent location, because peonies resent being moved. In the earth that has settled, place the roots so that the eyes will be between two and three inches below the ground. If planted too deep they will not bloom; if not deep enough, the frost will heave them out of the ground, or the rains will wash the earth away from them. Should the root divisions be very small and expensive, it would be a good idea to put them in a cold-frame for the first year and treat them tenderly. The first winter after planting the roots, they should be mulched; after that, however, it is unnecessary, except in the case of seedlings and small divisions. Unquestionably it is not wise to use manure as a mulch; likewise is it wrong to allow the dead foliage from the flowers to rot upon new plants. Cut it off of the plants in the fall and throw it away. When one's peonies refuse to bloom, the trouble may be safely laid to too much shade, excessively deep planting, or manure in direct contact with the plants.

In propagating the peony, a clump is lifted and the fleshy roots which are joined together at the top in the crown are cut up with a knife so that with every root there is attached a piece of the crown with the buds that form there. These root-divisions, as they are called, are then planted so that the eyes will not be less than two inches and not more than three inches under the grade line of the soil, with the result that every one of them in time forms a new clump. One-year roots are those from the divisions of the previous year.

With peony lovers this division of the roots seems to have approached the status of a fine art. In the middle of September, and perhaps in October if the weather is not freezing, lift the bunch of roots which are to be divided. In doing this, great care should be taken to shake the earth from them carefully so that the long roots will not be broken. Remove the leaves and stalks, and with a long sharp knife, never a spade as many thoughtless gardeners suggest, cut so that the buds and roots will be evenly distributed. Two or three year old roots are the best to be divided again; those peonies which increase their root growth slowly should be given three years between dividing times, but the rapidly producing root types may be divided every two years.

All new varieties are started from seeds. It takes approximately seven years for a seedling to become reliable as to type. It may be of interest to some peony growers to know that they can so treat seeds in the fall that they will grow the first year, instead of the second, as many erroneously suppose, thus saving a year's time. After the blooming season is well over, in July or August, when the seed-pods on the plants begin to open and one can see the seeds resembling peas inside, they should be collected at once and not allowed to lose their sticky moisture, which would cause them to become hard and dry, for in that state they would not germinate for two or three years. It is important that the seeds be kept damp—put them in a bucket and cover them with damp moss, wetting them frequently so that they will not dry out. It will be found that if this is done and the seeds planted in a cold-frame the same fall that they are picked, they will germinate the first spring, and the following autumn may be transplanted.

Happily, the peony is extraordinarily vigorous and free from insects and disease, root gall being the only trouble of importance. Fortunately it requires neither spraying nor pruning as do so many other flowers. Growing peonies away from all other plants; burning the foliage as soon as it wilts to prevent any possible spread of disease; and keeping manure away from the roots because of its aid to the growth of fungus spores, will go a long way toward eliminating peony disease.



CAUGHT IN THE ACT

The flare of the flashlight and the click of the shutter reveal and capture a night wanderer

FLASHLIGHTING the SNOWSHOE HARE

A Camera Exploit that Boasts Many a Thrill

by A. B. Brooks

Photographs by the Author

BEFORE dark the camera had been placed in a thicket and focused on a spot about ten feet away. The flashlight gun had been loaded and stationed; the trip wire connected with the battery, camera, and flashlight; the trigger set. My last conscious thoughts as I fell asleep in the shack were of the "set" in the woods. The last sounds I heard were the notes of a barred owl, a deer mouse rustling dry leaves, and a branch brushing against the roof.

Suddenly I was awakened by the distant sound of an explosion. There had been a flare and the "eye" of the camera had opened and closed. On the film was recorded the image of some wild animal! What was it? The imagination had full sway. What startled creature had fled from the sudden explosion and brilliant light? What would the developed negative show? Would the exposure be correct? Would the position of the animal be as desired? A confusion of thoughts like these raced through my excited mind, as I impatiently awaited the coming of the morning.

This article in our photographic series suggests a fascinating field for camera use, interesting by virtue of the anticipation it involves and the mystery that surrounds it. Try it this summer at camp in the woods.

Hurrying to the "set" in the early dawn I returned with the "quarry", entered the improvised dark room, turned on the ruby light, and immersed the film in the developer. Leaning forward I looked intently to catch the appearance of the first outlines. Soon a form emerged, at first dim, then more distinct, until finally the light revealed a white creature distinct against the inky background of the night,—a snowshoe hare!

Only the hunter with a camera can fully understand and appreciate the excitement of anticipation and thrill of accomplishment that come with photographing wild animals at night. To the pleasures of daylight portrayal

there is added the interest of unique preparation, the uncertainty of outcome, the mystery of the night, and the possibility of unusual results obtainable only in the darkness.

The successful trapper with a camera must attend to details. The habits of the animal whose photograph is sought must be studied, a suitable site selected and prepared, and the equipment carefully tested and placed. The photographer must have the sensation of confident expectancy, if he is to realize the best results. A careless or indifferent attitude toward his preparations will invariably mean the neglect of some essential.

WHEN NIGHT COMES IN THE WOODS

Then the nocturnal animals fare forth from thicket and den, active and alert

I spent part of one winter on the east shore of Schroon Lake, in the Adirondack Mountains, living with three companions in a shack among the trees. There I had the opportunity of a closer acquaintance with the snowshoe hare, that shy night-rover, with its winter coat of white, its summer coat of gray, and its snowshoe-like feet. The dense stands of white pine along the lake and the adjacent thickets of deciduous shrubs and briers are the chosen home of this timid creature. From October until April his searches for food, his frolics, and his retreats from the enemy were found recorded in the snow.

To make a photographic study, therefore, one had but to secure the necessary equipment, obtain food that was more to the hare's liking than its usual diet of bark and twigs, and exercise a reasonable amount of patience. My outfit consisted of a 3-A Kodak, with a Zeiss Anastigmat, No. 4, F-6.3 lens, and a hand-made flashlight gun and attachments. Apples and other fresh fruits were used as "bait".

The snowshoes were found to be more active in the early part of the night than in the hours after midnight. The flash was almost invariably discharged, if at all, before ten o'clock. Since I discovered that the hares had no fear of me when I stood motionless, I took advantage of this at times to observe the effect of the blinding light and loud report when the flash was exploded. As might be expected of so sensitive, wild, and high-strung an animal, the terror-stricken "victim" would run headlong in whatever direction it was facing, tearing through weeds, briers or brush for a hundred feet or more. But, finding it was not pursued, the hare would slacken its pace, stop, face about, and timorously make its way back to the "bait". Apparently, the regrets at an unfinished meal were stronger than the fear of this strange thunder and lightning. Once I re-loaded and re-set the outfit and got a second photograph of the same hare, which lingered nearby until I had again become statuesque beside a white birch tree.

At various times hares were induced to approach closely enough to be touched or caught by hand. I have stood close by a feeding station, motionless until a visitor arrived. A quick grasp and the hare was wriggling and squealing in surprise. Two were caught in this manner in one night. A third was coaxed up to feed on an apple held in my hand, and an imperfect photograph made of it.

A NIBBLE AT THE BAIT AND THE CAMERA ACTS

To study properly the night animals they must be found at their night prowlings when others sleep

A large proportion of the wild animals, including the snowshoe hare, remain hidden in thickets and dens throughout the day. When darkness comes, and the owls are abroad, they emerge from their coverts, alert and active. It is then, and only then, that a true and accurate picture can be obtained, showing their natural activities in all their wildness.

Fay Welch

TAKING HOME SOME TREES FROM CAMP

Small trees, to be sure, but these Tanager Lodge boys hope they will grow in their home yards

CAMP GARDENS

A Valuable Phase of Camp Activity that Demands a Leader

by William G. Vinal

Director of Nature Guiding for the American Nature Association

In this article, the fifth in the series based upon the camp tour made for Nature Magazine, Dr. Vinal touches upon an important subject that has been allowed to decline since wartime days

CAMP gardening has been on the decline ever since the days of war gardens. Why? Surely the gardens are not to blame, so I fear we must place the blame on the leaders, and their methods. Their failure can be summed up simply as neglect to recognize that this activity must not be a chore. It must be, as it easily can be, a source of pleasure and interest. For example, it is merely a lesson in mathematics to dictate that corn should be planted four grains to a hill, the hills two and one-half feet apart in rows, the rows three feet apart, and so on. Instead, if the approach is made by pointing out that the corn shoots out while the bean backs out; that the blade is perfectly wind-resistant; that the leaf has a rain guard; that there are brace roots; that there is an ear of corn, usually miniature, at the base of every leaf; that there are literally hundreds of interesting things about corn and other things of the garden,—well, who wouldn't get excited with interest?

The short season is, of course, another handicap to camp gardening and crops should be planted that can be harvested. Lettuce and radishes are two of these. At Highland Nature the campers make sandwiches from their garden produce and sell them at the annual bazaar. At Tanager Lodge they pot red maples and balsams in paper drinking cups and take them home to plant. At the Luther Gulick Camp the garden director is an agricultural school graduate and a high school principal. At this camp they give a Gypsy degree to those who, besides fulfilling other requirements, work eight hours in the large camp garden, and this is the only camp where senior girls were observed working in the garden.

Therefore camp gardening must be interesting or its decline will end in demise. Merely tilling the soil is but a part of the work and there are life histories, experiments, and the war with insects to be considered. In Chapter XXXV of *Nature Guiding,* the writer has sought to suggest possibilities in camp gardening, and *Cultivated Plants,* the Cornell Rural School Leaflet, Vol. 18, No. 4, contains fine suggestions. Leadership, however, is the most important of all, and this leadership must recognize that gardening, more than any other activity, affords an opportunity for problem-solving and putting the child in sympathy with common, everyday events.

Flower girls, such as those at Tahoma and Onaway, who gather flowers for the tables and take care of the flower boxes, are a real part of a gardening program. When this is followed up by conversation, announcements and after-dinner stories, it is far better than regular flower shows, where the plants are set in mechanical rows and labelled. Rustic flower holders are attractive, and fern balls where the matrix is made of sphagnum moss, log cabin fern dishes, and window boxes add to the appearance of the room. Wabunaki and Kehonka use birch logs which have been bored to hold test tubes. Wild plants may be brought from the woods, a good supply of black humus along with them, and planted carefully in some moist shady location as nearly like the former conditions as possible. If the royal and ostrich fern are native but not found in the camp grounds, they may be transplanted to add beauty to the wild garden.

Nearly every camp has a swamp nearby, but some directors have a chill or fever at the mention of going to a swamp for enjoyment. They picture reptiles, evil insects and other imaginary dangers. Yet some of the

most interesting flowers grow in bogs. Aloha Hive has a natural bog garden just five minutes walk from headquarters. Just imagine! Five minutes to such gifts as pitcher plants, the showy orchis, sun dews and sphagnum moss! Jump on this bog and huge pines some seventy feet away will quake. What a library of stories about plants that eat insects, moss that makes coal, and the sphagnum that was used for surgical dressings during the war! The bog detour on this Nature trail was surely well-patronized.

Chewonki's Nature trail also led past some arrow heads sticking their long leaf spikes above the water. Anawan has long trips to gather bog plants for its museum. Kehonka has an aquatic garden and boggery protected by a sand pit. At Wyonegonic Mr. Battey has made an aquatic garden by damming a small stream.

There are those who think that only a rich man can afford a water garden. The only requirement in riches is to be a zealous lover of aquatic plants. The natural bog needs no excavator, and the plumbing is taken care of by Nature's springs. If stepping stones are laid one may enter the bog dry-shod. To change a bog is to destroy its uniqueness, and they are becoming so rare that it is up to camp directors to preserve those which are discovered in their vicinity.

FAY WELCH

TWO PROUD FARMER GIRLS AT CAMP

They planted their own garden and harvested a crop of lettuce, radishes, carrots and onions

It is better to have the campers go to the bogs to view the rarer plants than to bring them into camp. A fine scheme to instruct campers as to which flowers should not to be picked, is to post colored pictures of these flowers. Some of these have recently been published by Nature Magazine. The loose leaf edition of the New York Flower Book is well adapted to this use. The New England Wild Flower Preservation Society, Horticultural Hall, 300 Massachusetts Avenue, Boston, Mass., has published a new chart of 25 of our wild flowers which most need protection, with the English and botanical names, and which sells for $2.50, with 20 cents extra for mailing. Post cards of our rare wild flowers can be obtained from the National Wild Flower Preservation Society, Washington, D. C. The Hyde Chart of Wild Flowers is published and sold by the Garden Club of America, 598 Madison Avenue, New York City.

Essay competition papers are sent out by the Horticultural Society of New York City, 598 Madison Avenue, and the Keystone View Company and the New England Society send out slides and printed lectures which can be given by the campers themselves. The Samuel Fessenden Clark Wild Flower Contest is being carried on by several camps. Information can be obtained by addressing Mr. Clark Williams, 160 Broadway, New York City. Wild flower seeds are sold by many dealers. It is much better to buy these than to risk transplanting the more delicate varieties. The wild flower garden and the fern walk denote character for any camp.

Another interesting side of wild flower gardening in camp is that of soil testing as brought out in article in the April issue of Nature Magazine. It introduces the camper to soils and their variations and contains a lesson in environment. Soil testing outfits can be obtained at a small cost now that the demand for them has increased, and two or three of these should be in every camp that appreciates the value and interest of a wild flower garden. The Camp Editor of Nature Magazine will be pleased to direct any camp official to the best sources of advice on this phase of camp activities. Don't overlook your camp garden and its possibilities.

FAY WELCH

THE FOREST NURSERY IS A GARDEN ALSO

Dr. Vinal's first article in this series emphasized the importance of forestry in the camp

HINTS AND HELPS

FOR

HOME and GARDEN

MAY

by
Thomas Sheward

In the milder sections of the country, all kinds of bedding plants will be set out this month, also tomatoes, melons, cucumbers, eggplants, and peppers.

* * *

Where bulbs have been flowering in beds that are to be used during the summer for annuals, these can be taken up and planted in shallow trenches to finish ripening.

* * *

Hotbeds that have been used for growing early vegetable plants and flowers can be used during the summer for melons, cucumbers, and early dwarf celery. Early golden self-blanching celery is planted in the hotbed, and mushroom spawn in the manure. The celery is very tender grown this way.

* * *

Many rock plants are propagated this month from cuttings. Rock roses, aubretia, saxifrages, and others can all be easily rooted in the frame. In the northern states all kinds of vegetables can be planted this month. Hardy annuals are sown where they are to flower, and perennials sown for flowering next year.

* * *

New lawns, if it is to be a spring lawn, should be sown early this month, if this has not been done already, and old lawns mown and rolled each week.

* * *

A very interesting feature for the children's garden during the summer is the floral wigwam, illustrated. This is made with poles, and covered with morning glories or other suitable vines, string being used to train the plants.

* * *

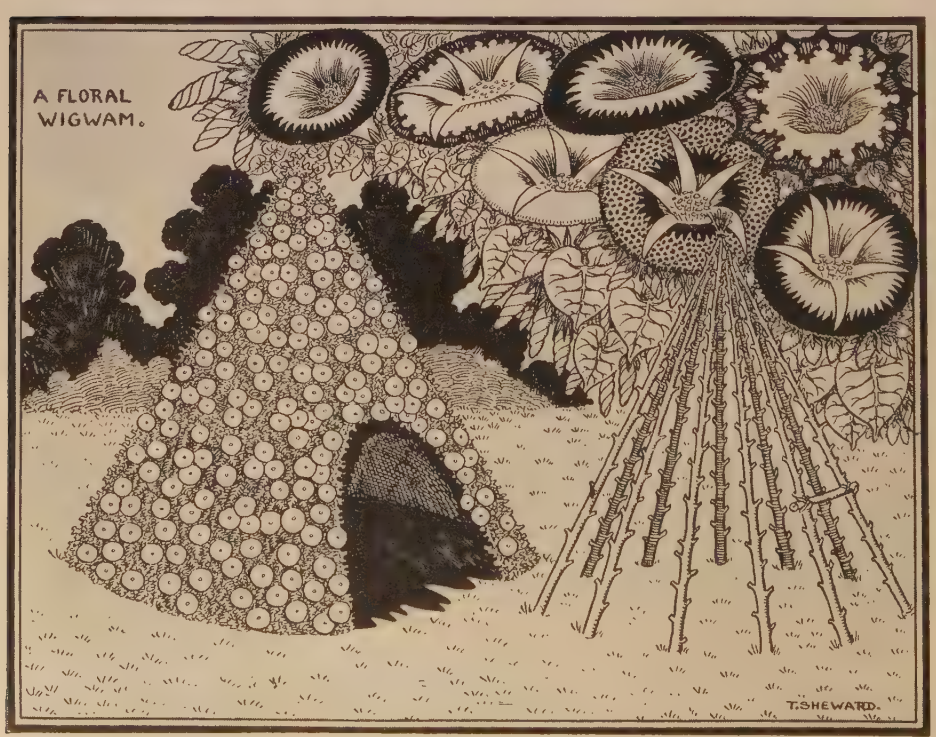
Spring flowering shrubs are pruned this month or in June, as soon as the flowers are over, as shown in the illustration. This consists of cutting out the old flowering wood to a strong new shoot, which is to flower next year. The drawing shows the system, and not as the bush should appear after pruning. New shoots are seen starting from the bottom near the ground, which will make flowering wood about two years afterwards. Shrubs to be pruned this way are deutzia, forsythia, weigelia, and some of the spireas.

* * *

Green cuttings of many shrubs can be rooted in the garden frame or a box covered with a sheet of glass. These, properly handled, make nice bushes when two years old. After rooting they are planted out in rich soil topped when necessary, to make nicely shaped bushes, and soon form fine plants.

* * *

A garden aquarium is very interesting during the summer, when stocked with suitable fishes and water plants. The illustration shows how to construct one. The proper depth to excavate is three feet, which allows for two and a half feet of water, and a good size would be eight or ten feet diameter. Old bricks are used to line the pool, and these are cemented together with a mixture of one part cement to two of fine sand, and afterwards lined four inches deep inside with the same mixture, to make it water-proof. If green color mix is used with the cement, it looks much better. A piece of two-inch pipe is used for an outlet, with a valve for changing the water, this being connected to a drain. The mixture of cement and sand should not be too wet or it will not work well when using the trowel.



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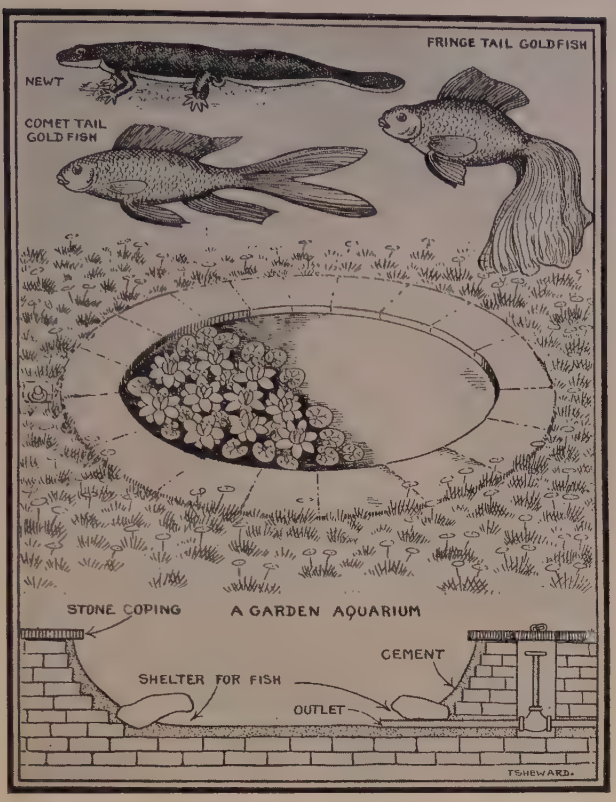
There is another way to make a pool without using the bricks. Mark out

the site of the pool and drive a stake in the center, then fasten string to it, with an old knife tied to the other end for marking out two circles four feet apart. The turf is taken up and the soil excavated three feet deep, with a garden trowel, then filled with concrete. When this is set after about six days, the soil in the center is removed and you have a round pool, ready for a coating of fine cement and sand, after the bottom has been filled in with concrete, to make it waterproof. The concrete should be well washed before finishing with cement, and an outlet provided for draining, before filling the bottom with concrete. Suitable fishes and plants would be gold fish, sun fish, stone loach, satin fins, and the fan-tailed darter. Newts and turtles could also be kept. The dwarf water lily, *Nymphaea pygmea*, water hyacinths, water poppy, water milfoils, water frogbite, and the pondweeds would be desirable plants.



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To make linoleum wear for a long time, it should be varnished when new, and waxed every week.

* * *

To polish furniture use equal parts of linseed oil and turpentine. Rub this in with a cloth till dry, then polish with chamois or soft woolen cloth.

* * *

When windows stick, the mouldings should be removed and the frame rubbed with soap or paraffin wax.

* * *

To prevent mosquitoes entering the bedroom at night, burn Persian powder in a paper tube for about one hour before retiring. Two ounces oil of citronella, one ounce oil of cedar, one ounce spirits of camphor rubbed on the hands and face, is also very effective.

* * *

To soften dry glue use a little vinegar before using.

* * *

To give a fine polish to the stove add one tablespoonful of powdered alum to ordinary stove polish before using.

* * *

When cutting hot bread or cakes the knife should be heated slightly, for clean cutting.

* * *

Green parsley eaten with young onions as a salad, takes away the odor of the onions.

* * *

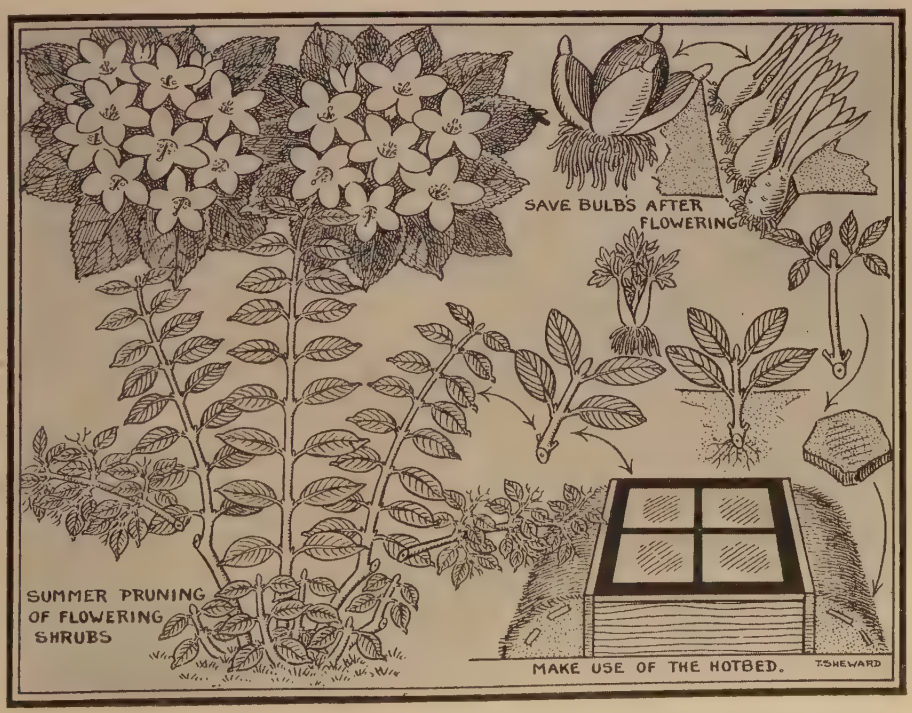
To prevent milk from burning when boiling, first cover the bottom of the saucepan with water, and boil for a few minutes before filling with milk.

* * *

In this department in March a partial list of flowers showing their colors, time of blooming, height and type was printed as a guide to planning the garden from the point of view of color combinations. This list has been added to and is now available to readers of Nature Magazine for a two-cent stamp. Just ask for the Garden Chart.

* * *

Do not fail to read carefully the peony article in this issue. It is full of excellent advice for the garden lover and useful instructions on the choice of peonies and their cultivation. A fine series of helpful garden articles is planned for the remainder of this year. These include articles on planning your garden and home ground plantings as well as articles on the selection and care of flowers.



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A School Garden

Something that Produces More than Vegetables

by E. K. Jacobson and R. D. Dahlin

In view of the helpful character of this article, Dr. Palmer has given over his department, and more, to it this month.

As kindergarten teachers in the public schools we had often attempted gardens. They were always miniature in size, ridiculously small patches enclosed with string, and yielding but meager results. A few woody radishes and some lettuce leaves to be used for sandwiches at our annual school picnic were all we ever hoped for in the way of practical returns. From time to time, however, we were aware that we had unnecessarily limited ourselves in making provision for this experience. To watch the children tend their small plot of ground, to know that a child would run all the way home to announce the appearance of the first radish, and to see the evident satisfaction in observing the process of plant growth from seed to fruitage were intimations enough that here lay untouched possibilities for teacher and child. We determined to expand.

We began early in the spring. A vacant lot across the street from the school house was secured. With permission to use it as we chose, we went to work. As there were trees at the rear we selected the sunny end and marked off a space thirty by ninety feet. Stones and tin cans had to be hauled away. We found the clearing of it no small task. When it came to spading and getting the soil ready for use, the work was too heavy for five- and six-year old children and we asked the help of the boys in the opportunity room. This outdoor work appealed to them as it afforded welcome escape from the routine of regular school work. Without the cooperation of these boys our garden could never have been what it was. They spaded. They raked. They brought black dirt in wheelbarrows, but in the end they were not satisfied. One evening one of the boys took matters in his own hands and, quite unsolicited, borrowed his father's team of horses. In the morning we found a ploughed garden well covered with dressing.

We bought lumber for a fence with money the kindergarten children had earned. After the older boys had set the posts many small, willing hands nailed on laths and applied white paint. Spring was late that year and weather conditions were not always favorable. We often worked between showers and in the cold. One raw, windy day the interest lagged and it took a little encouragement on our

A VIEW OF THE WILLIAM PENN GARDEN
From its comparatively small expanse the youthful gardeners harvested more than vegetables

part to keep the painters at the task of putting on the second coat of paint. One little fellow said, in all seriousness, "If it would only warm up maybe the fence wouldn't need two coats". But at last it was finished and we began to plant. We put in rows of corn, pumpkins, and potatoes, beds of beans, beets, carrots, spinach, lettuce, radishes, and many kinds of flower seeds.

By the time school closed for the summer vacation, the garden looked quite promising, but our task did not end with the closing of school. We found we had a continual battle with weeds. A long, hot, dry August brought discouragement to us all. But how could we give up when one small child had faith and patience enough to carry water in a teacup from her mother's kitchen sink to water the drooping zinnias. We took courage and went on. We fought the drought with a leaky hose. Though tormented by mosquitoes we did not slacken our efforts to exterminate the weeds and potato beetles. In the end we brought the garden through. With the children's help and the neighbors' cooperation it was in its prime when school opened in September. Bright zinnias crowded close to the little white fence, nasturtiums and gay portulacas bordered the paths, while tall blue bachelor buttons made a contrasting background for California poppies and calendulas. Sweet alyssum in spreading patches gave out its delicate fragrance. Birds in plenty found our bird bath; butterflies and bees were daily visitors.

We had the satisfaction of knowing that our garden gave pleasure not only to the kindergarten but to all the children in the school and to the fathers and mothers in the neighborhood. Not the least part of our satisfaction lay in the fact that the spirit of the whole undertaking had been such that no one seemed to want to molest the garden and that at the end of the season thirty ripened pumpkins were left on the vines.

The day the harvest was gathered it was a proud procession that carried the load of potatoes, beets, carrots, and pumpkins to the school house. A sale of these followed and the general wish was that the money realized should be used in making another garden. In order to prepare for this we had a floral shop in the spring. We bought bulbs, planted seeds from the garden and started slips in the sand box. This afforded a splendid opportunity for learning the art of transplanting. It was gratifying to see the careful way in which little five-year old children potted the seedlings. Their interest and joy in it were a constant delight to those of us who watched them at work. The appearance of the tiny seed leaves on a dicotyledonous plant was marked by our youngest with the exclamation, "Oh, see! It is opening its mouth."

Soon after the spring vacation we were ready for our outdoor garden. During the winter a house had been built on the lot used the previous summer and we were obliged to find a new location. We were glad indeed when we learned that the Board of Education owned a lot across the street from the school house and because of the success of our first garden they were willing for us to use it. It was an attractive lot, being high and sunny. With the acquisition of this piece of ground we determined upon further expansion. Instead of a kindergarten enterprise we found ourselves face to face with a whole school garden. The lot was divided into three parts separated by fences. The

THE TITLE originally given to this article by its authors, who are kindergarten teachers at the William Penn School, Minneapolis, was "A School Garden and Some of Its Measurable Outcomes". These outcomes were in the form of activities carried into execution; in vocabulary added to by the experience; in Nature knowledge of growing things and in self expression. The children learned how long a hen sits, and why; what results; how the chicks get out, what they eat and where they sleep. They discovered that mud turtles swim, polliwogs turn into frogs, birds like to bathe and that it is a good thing to have a toad in the garden to eat bugs and many other things.

AND THEN CAME THE HARVEST TIME

It was a proud lot of youngsters that gathered the produce and carried it to the school

front part was our flower garden; the middle part our vegetable garden; and the rear part our pet-yard.

The principal of the school called the boys together and asked for their cooperation in preparing the soil and helping with the fences. We then made a complete diagram of the garden and posted it in the school hall. To this we added a bulletin which asked each room to indicate its choice of labor in carrying out the plans. The enthusiasm ran high.

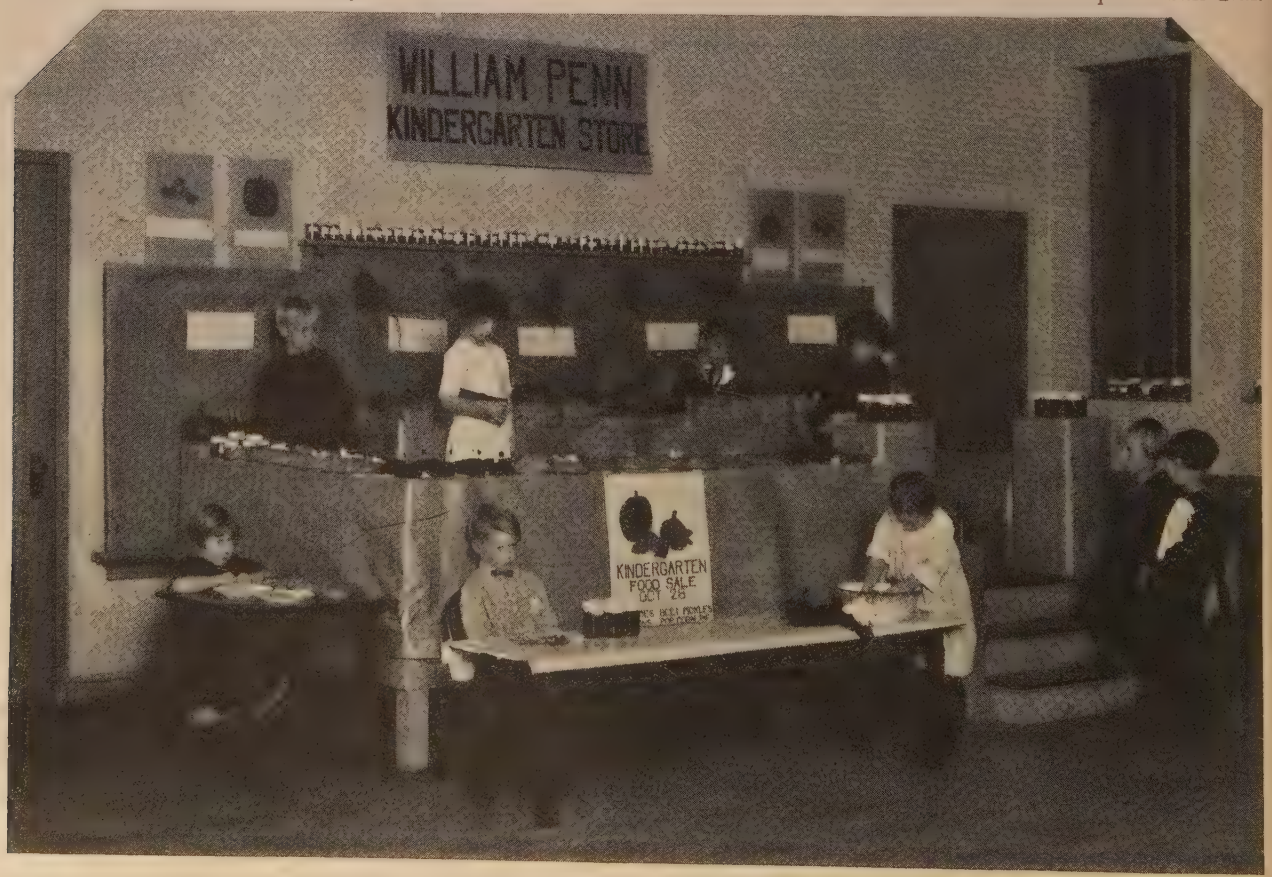
Among the activities that the school garden brought about were grading and plowing; building and painting fences; diagraming flower and vegetable beds before planting; planting seeds; building henhouse and yard; mixing cement for a pool; making the pool; constructing bird houses; gathering water creatures for the pool; observing these tenants and the birds, bees, butterflies, caterpillars and other insects in the garden; and caring for the garden. All practical helps.

As the weather did not permit much outdoor work, we began making our henhouse, for the care of an old mother hen and her brood of little chicks was one of our first thoughts in connection with the pet-yard. In visiting henhouses in the neighborhood and in reading from poultry journals we learned what were the essentials of a good henhouse. We found that a large packing box made an easy beginning. By adding a door, a window, a ventilator, and a shingled roof, we had an ideal house for a mother hen. We painted the house white and the roof green. When completed it was moved out into the pet-yard.

The father of one of the children loaned us a good old barred Plymouth Rock and gave the setting of fourteen eggs. We decided to choose the hen's name by means of a contest. As Henny Penny seemed to be the most popular name submitted, it was chosen. Three weeks seemed a long time to wait but on the twenty-first day Henny Penny came off her nest with a fine brood of nine baby chicks, which the children never grew tired of watching. And evidence was not lacking that the older children were in need of such experiences when a fifth grade boy presented himself at the desk one morning with the query, "Is your hen a he or a she? I want to name it". And when, after three weeks of patient setting, Henny Penny was enjoying her first morning of motherhood, a sixth grade boy wanted to know if it were not time to start her again on a new nest of eggs, we realized that children even in an outlying district are missing knowledge that we once thought the common possession of all children.

Another interesting feature of the pet-yard was our concrete pool for water animals and insects. The boys in the fifth and sixth grades made this. It was nine feet long, five feet wide, and one foot deep. The first grade children, each with a pail, made a visit to a nearby swamp to get duck weed, pond water, and polliwogs. It took no urging on our part to get the older boys further to stock this pool. It was abundantly supplied with crayfish, frogs, painted and snapping turtles, and many water beetles and insects.

Bird houses were popular in the pet-yard. There were single apartments, duplexes, and four family flats. One boy made a feeding station. He hung it on a wire between two trees and by means of an ingenious pulley arrangement could lower it to the ground when he wished. The sixth grade children were ambitious to attempt a sun-dial.



THE GARDENERS OPEN THEIR STORE

The sale of the produce won from the soil by their own hard work was a great event

This occasioned early rising on the part of some when it came to marking the dial in the early morning hours. A bird bath was put in the flower garden. As the lot was high, steps were necessary. These the older boys made of concrete. Other boys undertook the sodding of the terrace and the pet-yard. Some of the older girls dug up wild rose bushes and planted them. Neighbors donated dahlia bulbs, iris, lily of the valley, and hollyhock plants. Each room in the building had its own particular vegetable or flower bed. The superintendent of schools showed his interest by sending some cotton seeds which grew, even though they did not produce cotton.

Perhaps at no time did our feelings run deeper than they did one morning in midsummer when we went to the garden to weed. It was not long before children came, wanting to help. One boy brought a lawn mower and cut the grass in the pet-yard. Busy hands hunted for weeds among the flowers. Now and then a mother or father passed and stopped to chat with us about the garden. It was a pleasing sight: corn in tassel, golden pumpkin blossoms, and a wealth of color in the flower garden,—zinnias, bachelor buttons, calendula, California poppies, petunias, snap-dragons, nasturtiums, marigolds, sweet alyssum, portulacas, pansies and morning glories. As we worked our thoughts ran back to the gardens of other days. We realized that we had gone a long way from the temporary and passing interest of the radish patch to the garden that is not only a present joy but holds future promise. It is good to know that the hollyhocks planted against the fence this spring will continue to bloom from year to year.

A Fool-proof Mushroom of May

Even the Careless Cannot Mistake the Morel

by G. G. Nearing

G. G. NEARING

STUFF THESE MUSHROOMS

You will find them by the hundreds, in the damp mornings, on the hillsides

The Morel is so familiar an object in spring landscapes that you would think its name at least should be better known. Anyone who picks violets is bound to see this humble and much abused food plant, unless there are foreigners living near. Italians in particular will scour the woods at sunrise for such a delicacy, so if you have foreigners in your neighborhood, do your mushroom hunting early.

For a safe mushroom, one which can be picked by the uninitiated without the slightest danger of confusing it with a poisonous toadstool, the Morel has hardly an equal. Simply take an illustration with you to the stream bank or wooded hillside some damp morning late in May, and look around until you see a Morel. Then forever afterward you will *know* this fungus.

The color is buff or pale gray, with a buff or whitish stem. The most common and largest species, *Morchella esculenta,* reaches a height of five or six inches, but there are dwarf species as small as one inch.

Hillsides where there are a few trees may be expected to produce Morels, especially where the ground is loamy and rather bare. Sometimes they grow in the woods, sometimes under isolated trees in pastures.

In favorable weather after a showery, misty night you may sometimes find thousands of these odd growths, and pick many basketfuls. Usually you will be well satisfied if after hunting half an hour you have a couple of dozen.

Morels may be fried or stewed like ordinary mushrooms, but nature evidently intended them for stuffing. They are hollow like a glove. Stuffed as you would stuff peppers, they make a most unusual and delicious dish.

Yet how many mothers have said to their children, "Keep away from that nasty toadstool. Don't go near it or it will kill you"! The mother of course doesn't know and plays safe. But the child grows up with an unjustified horror of all fungi, whether good or bad.

TO USE, HOLD OVER THE HEAD WITH TOP TOWARD THE NORTH

This map is designed for use May 1, 9 p. m.; May 15, 8 p. m.; May 31, 7 p. m.

STAR-GAZING *in* DIFFERENT LANDS

From Tropics to Far Arctic, Brilliant Heavens Reign

by Isabel M. Lewis

THE FINEST location in the world for a general study of the heavens and particularly of the planets is a lofty elevation within the tropics. Here may be seen the best constellations of both hemispheres. Here the Zodiac arches high across the heavens and the planets may be seen at the highest possible elevation above the horizon, free from all the disturbing effects produced by the densest layers of the earth's atmosphere which lie along the horizon.

Within the tropics one may see to equal advantage the most interesting constellations of the northern and southern hemispheres,—Perseus, Auriga, Boötes, Hercules, Lyra and Cygnus of the northern hemisphere, and Argo Navis, Centaurus, Crux, Pavo, Grus Phoenix and Eridanus of the southern hemisphere. Scorpio, which trails its long tail below the southern horizon in mid-northern latitudes and hides some of its finest stars from our view is seen for its entire length high in the heavens within the tropics and is recognized as one of the finest constellations in the sky. The same may be said of the fine neighboring constellation of Sagittarius, beautiful even when seen at a disadvantage in our latitudes.

The only constellations that cannot be seen to advantage in the tropics are those in the immediate vicinity of the north and south poles. There is little disadvantage here so far as the heavens above the south pole are concerned for there is no bright star to mark them and no conspicuous constellation.

At the equator Polaris, the northern pole-star, lies on

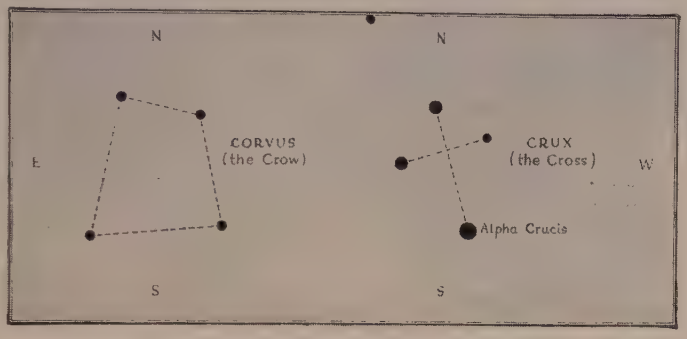
the horizon and south of the equator it disappears from view below the northern horizon. Our Big Dipper, however, may be seen to advantage as far south as 30 degrees south latitude, where it appears for short periods at the proper time of night and season above the observer's northern horizon.

North of the equator the altitude of the North Star always equals the latitude of the place. At the north pole it appears directly overhead and every twenty-four hours all the constellations in sight complete one revolution around it, never at any time passing below the horizon.

Within the Arctic Circle, little star-gazing is possible in summer. During part of this time the sun remains constantly above the horizon, and at midnight may be seen on the meridian due north. At the Arctic Circle, or rather a little south of it, due to the effect of refraction, the Midnight Sun may be seen for only a day at the beginning of summer, when the sun is farthest north. At the north pole, however, it is above the horizon for six months. Between the Arctic Circle and the north pole the length of time that the sun remains continuously above the horizon in summer varies with the distance of the observer from the pole,—the nearer to the pole, the longer the period of continuous daylight. During this period, of course, star-gazing is impossible and even after the sun has disappeared below the horizon many more days follow when it is so close to it that twilight following sunset nearly merges with twilight preceding sunrise. This also interferes seriously with star-gazing so within the Arctic Circle one sees little of the stars in summer. Added to this is the disadvantage that the celestial equator lies close to the horizon, and at the north pole coincides with it, so that the planets, when south of the equator, either lie below the southern horizon or are so close to it that they cannot be seen to any advantage. This is particularly true of Scorpio and Sagittarius. Star-gazers within the Arctic Circle, in Alaska, northern Canada, Iceland, northern Norway and Sweden and Siberia have little acquaintance with these two beautiful zodiacal constellations, always viewing them at a disadvantage either on or close to their southern horizons. The first magnitude star Antares, in Scorpio, cannot be seen north of latitude 64 degrees. Sirius is invisible north of 73 degrees and Spica in Virgo north of 79 degrees. Six of the twenty brightest stars are invisible north of the 60th parallel and five of these,—Canopus, Alpha Centauri, Beta Centauri, Achernar and Alpha Crucis, all in the Southern Cross,—are invisible even in the latitude of Washington.

Miami, Florida, boasts of its Southern Cross Observatory which is so named because the Southern Cross appears entirely above the horizon in that latitude. All of the twenty brightest stars in the heavens may be seen there.

Northern visitors to the southern hemisphere, when as far south as South Africa, Argentina, New Zealand or Australia, are struck by the strange appearance and general topsy-turviness of the southern skies. Even the same groups that are seen in northern lands along the celestial equator and the ecliptic look queer. Orion and Leo, which cross the meridian in winter and spring in the north, may be seen in the southern hemisphere to cross the meridian on summer and early fall evenings in inverted position, with heads directed downward toward the northern horizon, and in a *right to left* instead of the left to right direction with which we are familiar in the northern hemisphere. The same counter-clock-wise, or right to left, direction of motion from rising to setting is observable also, of course, in the case of the sun, moon and planets all of which pass north instead of south of the zenith.



BRILLIANT IN MAY HEAVENS

The Southern Cross, however, cannot be seen north of 27 degrees north latitude. Both cross the meridian together

The Southern Cross brings forth universal praise from northern visitors. Its compactness and regular outline and the brightness of its stars all add to its beauty as well as does the fact that it is embedded in one of the richest fields of the Milky Way. The southern hemisphere also has its share of celestial curiosities and splendors. It is famed for its beautiful Magellanic Clouds, its Coal Sacks and richly luminous star fields in the Milky Way particularly in that magnificent and huge constellation of Argo Navis, in Crux, The Cross, and in Centaurus, which contains Alpha Centauri, nearest to the earth of all the bright stars. Magnificent star clusters, peculiar variable stars and Novas and many comets add to the delights of star-gazers in the southern hemisphere. In more recent years a need for more and better observatories in the southern hemisphere is being partly met by the establishment of branches of northern observatories in South Africa and South America. With the heavens so closely patrolled little of interest or importance can long escape discovery in either hemisphere.

To return to our northern skies for May, we find that Ursa Major is now on the meridian due north, so the Big Dipper is seen at its best in the evening sky at this time of year. Leo has now passed to the western half of the sky. Denebola at the tip of the Lion's tail is due south at nine p. m., May 1st. Gemini is still conspicuous in the west while Boötes and Virgo cover a large area east and southeast of the meridian. Hydra with Corvus and Crater now covers nearly all of the southern heavens below the equator. The head of Hydra lies directly south of Cancer and the tip of his tail lies a little to the southeast of Spica in Virgo.

This is also the time of year when Crux, The Southern Cross, is seen to the best advantage in the evening sky if one is far enough south to see it at all. It lies

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Field View: Millions of Daffodils nodding welcome to Spring in our Long Island Nurseries.

Oval Insert: The Juniors doing the welcoming honors in our showgrounds at Oyster Bay.

Star-gazing in Different Lands

(*Continued from page 331*)

almost exactly forty degrees due south of Corvus, and so crosses the meridian at the same time. It may be seen for a short time in the evening at this time of year in southern Florida. As shown by the diagram it is about equal in extent to the small constellation of Corvus. Its brightest star, Alpha Crucis, is of the first magnitude. Beta, next in brilliancy and farthest east in position, is midway between the first and second magnitude in brightness. Gamma, farthest north, is a second magnitude star and Delta Crucis, on the west, is of the third magnitude, about equal in brightness to any one of the four stars in Corvus. The Southern Cross is seen to very poor advantage in Florida and even as far south as Cuba. To appreciate its beauties one should see it from a position at least well within the tropics where it reaches an altitude high above the horizon when crossing the meridian. No object in the heavens can be seen to advantage when it lies close to the horizon where its brilliancy is dimmed by atmospheric haze. Yet even a poor view of this gem of the southern hemisphere is eagerly sought by telescopes of northern star-gazers.

Saturn is now coming into fine position for observation in the evening sky. It rises in Scorpio shortly after the time for which the chart is given and is in view for the remainder of the night.

Jupiter is now a Morning Star in Pisces but will be too close to the sun for observation until after the middle of the month.

Mars also is in Pisces this month and quite low in the east at sunrise. Venus is still a Morning Star but is now getting almost too close to the sun to be seen well. It will be found in the northeast in Aries on May 15.

Mercury is an Evening Star after the 3rd when it is in superior conjunction with the sun but it will be too close to the sun to be seen until the last week in May when it may possibly be found in the evening twilight low in the northwest.

There will be a total eclipse of the sun on May 19 but it will be visible only over a small track in the South Atlantic with small partial phases visible in the southern extremity of South America, from the Falkland Islands, from South Africa and from Madagascar.

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NATURE NEWS AND VIEWS

Yosemite Summer School

The fourth annual six-weeks' session of the Yosemite Summer School of Field Natural History will open in the Yosemite National Park under the direction of H. C. Bryant on June 25 and close on August 10, following the annual trip to the High Sierras. The school, conducted through co-operation between the Park Service, the Yosemite Park and Curry Company and the Yosemite National History Association, has proved popular among students seeking training for camp and school Nature leadership, and the number of applications are expected as hitherto to exceed the accommodations. With a staff of ten trained experts, a well equipped laboratory, and the facilities of a region rich in flora and fauna, the school has proved to be a leader in a growing field of educational development.

Chrysanthemums

The culture by amateurs of small-blossom chrysanthemums is practical over all parts of the Union, except in the northern tier of states and on the great plains, provided proper strains are chosen, the United States Department of Agriculture announces, in pointing out that these flowers, with their large color range, make beautiful additions to the autumn garden. Among the hints which the department at Washington will readily supply on request are recommendations for heavily feeding the avaricious plants with stable manure or compost in the bed; and later with liquid manure alternated with solutions of nitrate of soda and sulphate of ammonia. Only the hardy varieties may be grown north of the Ohio River and central New York, although the early-flowering types may be cultivated like bedding plants and wintered in frostproof frames or cellars.

Highway Sign Tax

Col. Frederick Stuart Green, superintendent of the New York State Department of Public Works, recently recommended to the Legislature that all advertising signs on public highways be taxed, and seeks legal sanction for Public Works jurisdiction over signs erected along such tourist routes. In this way Col. Green hopes to prevent erection of signs without permission and state supervision.

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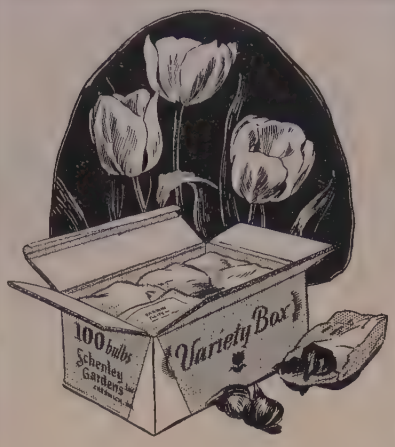

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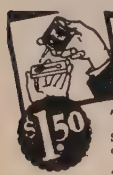

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Blister Rust Spreads

The continued spread of the white pine blister rust has necessitated the quarantining of the State of Idaho, and Clackamas, Hood River, Multonamah and Wasco counties of Oregon, the United States Department of Agriculture announces, in calling to the attention of shippers of currant or gooseberry plants, or five leaf pines, several important changes in the regulations. All shipments into Idaho must be accompanied by a control-area permit from the Directors of the Bureau of Plant Industry, Boise, Idaho, and intra-state shipment out of the infected Oregon regions is prohibited. Shipments of currant and gooseberry plants from infected states are to be strictly limited to those "in a dormant and defoliated condition".

Coals of Fire

The story of a dog who turned the other cheek with a vengeance comes from Germany, and the principal actors are Phylax and Herr Mueller. Mueller tired of his pet, and took him out in the woods, where he attached a cartridge to his back, lighted the fuse, tied him to a tree, and ran. Herr Mueller was hurrying on his way when a joyous bark greeted him, and Phylax, with the burning fuse nearing the cartridge, and the dangling end of rope showing how he had broken away, leaped around entirely pleased with the new game. The gentleman ran faster; so did the dog. A lake intervened in the landscape, and into it went Herr Mueller. He couldn't swim. He came up for the third time in the conventional manner,—then Phylax grabbed his collar, and nearly drowned in getting him ashore. No mention of cartridges or fuses has been made since.

Old Idea Exploded

The old theory that running water will purify itself in a few miles has been exploded by the United States Public Health Service, which has recently completed experiments on the rate of absorption by contaminated water of purifying oxygen. Some of the disease germs may be destroyed by the oxygen, the Service finds, but the process is too slow, and several hundred miles of river flow are necessary before the water is restored to purity.

Surplus Elk Shipped

More than 3300 elk have been shipped from Yellowstone National Park to twenty states, the Dominion of Canada and four National Parks for stocking purposes since 1892, when Congress approved the donation of the surplus creatures to public institutions. Forty-one cities and towns have been provided with elk for their zoological parks. These animals seem to thrive in all climates. They are caught with artificial feed in the winter season, when snow covers their summer feeding grounds.

For Better Gardens Perfect Flowers

Keep your plants free from Aphis—that almost invisible green insect which is so destructive of roses and other flowers, as well as fruits and vegetables. Besides all varieties of Aphis, "Black Leaf 40" is the "old reliable" insecticide for killing Thrip, Leaf Hopper, Red Bug and other pests that kept you from having perfect flowers. Now is the time to spray, so get a bottle from your dealer. 35 cents for a bottle large enough to make 6 gallons of effective spray.

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Be sure to read our special Garden Article on page 315

Forest Research Areas

Two new purchase units have been established in Michigan by the National Forest Reservation Commission for the purpose of forestry research to determine the best principles of forest management and scientific treatment, the U. S. Forest Service announces. These units consist of 250,000 acres known as the Marquette area, and 150,000 acres in the Mackinac region, both in the northern part of the state and eventually to be government-owned. While fire and axe have combed the region thoroughly, and 80 per cent. of the land must be replanted, yet the Forest Service believes that the timber will later prove of economic importance, and that the results gained from experimenting in a large scale will be a big factor in future conservation progress.

Zoo Inventory

With the report from London Zoological Gardens that the total value of the animals therein contained is merely $175,000, children and grown-ups, who have felt the creatures must actually be worth the thousands of dollars of pleasure they give, will have to re-arrange their ideas. The lordly lion is worth only a paltry $250, even with a good roar, while the tiger brings twice as much to the natives who bag him. In the animal Dunn and Bradstreet's, the Indian rhinoceros has the highest rating, being listed at near $5,000, but the python is sold by the yard, and does not bring fancy prices at that. These values, however, are not based on popularity or prestige,—if they were, the solemn comedians of Monkey Hill, who draw the largest audiences, and the awkward, frolicsome bears would have much larger values set against their names.

Indoor Tropical Plants

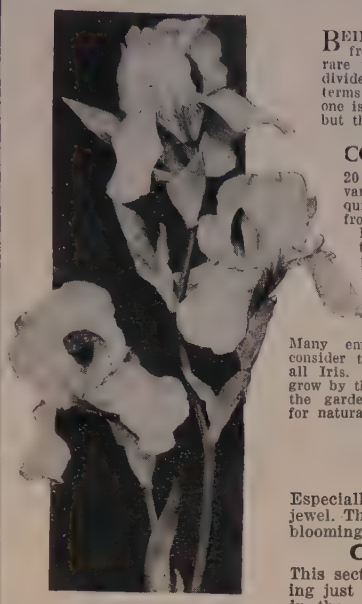
Palms and ornamental-leaved tropical plants can adapt themselves easily to indoor conditions, and suffer more from "overcare" than they do from lack of attention, according to Charles J. Hudson of the floriculture department of Cornell University. Over-watering and feeding are mainly responsible for yellowness and death, and proper drainage is needed. The "cast-iron" plants, so called, which include the century plant, rubber plant and sansevieria, will thrive despite all manners of abuse, he advises.

Bugs Have Busy Day

More than 50,000 insects—bed bugs, tumble-bugs, scarabs, butterflies, deer-flies, horseflies, and beetles—recently held an exhibition of their wares, colors, shapes, and habits under the auspices of the Pennsylvania State Bureau of Plant Industry, with A. B. Champlain and J. M. Knull in charge, at Harrisburg. Practically every insect who could call Pennsylvania his home had a place in the collection, and many foreign beetles, butterflies, and roaches were among those present.

An Unusual Opportunity to secure Choice and Rare Irises

at Exceptional Figures



BEING primarily a "Hobbyist" I gather choice and rare plants from all over the world, much the same as an art collector gathers rare works of art. But as plants will multiply, I am willing to divide my surplus with other flower lovers on the most favorable terms: I have more than 1000 choice varieties of Iris alone. Every one is a real gem; I would not give space in my gardens to anything but the best. Here are some of the bargains I am offering:

COLLECTION NO. 1

20 plants in ten extra choice varieties of Bearded Iris, all quite distinctive and different from each other, all properly labeled, my selection, plants that would cost 50c to $1.50 per plant if selected separately. 20 Plants for... **$5.00**

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25 Plants assorted, choice Beaded Iris in many different varieties, my selection, without labels, for..... **$4.00**

As I have only choice varieties, you are sure to be pleased with this Collection.

COLLECTION NO. 3—Siberian Iris

Many eminent authorities consider these the finest of all Iris. They are easy to grow by the waterside or in the garden, and are good for naturalizing.

Free flowering and exquisite for cut flowers.

10 Snow Queen (the finest white)
10 Blue King (a gorgeous blue)
10 of another variety, my selection.

Total 30 Plants, all properly labeled, for **$6.00**

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Especially adapted for the Rock Garden, each a miniature jewel. They bloom just after the crocus have finished blooming. 20 Plants in five varieties, my selection..... **$5.00**

COLLECTION NO. 5—Intermediate Iris

This section blooms just after the Dwarfs and finishes blooming just as the Taller Bearded Iris begin to bloom. They come in the early Spring just when flowers are most appreciated. Some very choice varieties will go into this Collection. 20 Plants in five varieties, my selection, all labeled, for..... **$5.00**

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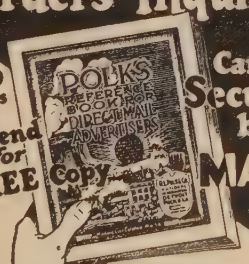

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Sequoia Trail Program

Mt. Whitney, the highest mountain in the United States, outside of Alaska, is soon to be conquered by the horse as well as man, if the present plans of the National Park Service to construct a horse trail up the 14,000 foot peak are carried through. Director Stephen T. Mather plans to extend the trail up the east side of the mountain to Whitney Pass, then north along the crest to the summit. Another trail down from the summit to Whitney Creek is to be built. Among other trail projects which the summer will see started is a re-routing of the High Sierra trail to cut out descent by the Seven Mile Hill trail into Buck Canyon, and a west boundary trail along the North Fork of the Kaweah River. The popularity of the park is well indicated by the fact that over 3,800 visitors from 24 states and several foreign countries registered during the chilly month of February. The winter was easy this year, park officials state, and measurements reveal that only 45 inches of snow on an average blanketed the park, while last year the depth was over 12 feet.

Victorious Robin

Circumstantial evidence of a battle to the death between a robin and a large Cooper hawk is reported by David Keck of the Yosemite National Park Service. The dead hawk, with his eye torn away, and a badly bruised robin, still alive but mortally injured, with feathers and skin torn from his breast, told the story. The hawk had evidently misjudged his lunge; the beak of the frightened robin had in some way penetrated his brain; and the two creatures of the wild both lost their lives in another of Nature's little contests from which only the fit survive. The victory, even in death, however, goes to the robin,—he was a David who slew his Goliath.

Adirondack Development

More than twenty camp-site and trail projects are planned for the Adirondack region during the spring, the New York State Conservation Department, in charge of camp and trail building, announces. Among the important developments which will take place are the construction of a camp site at the foot of Pok-O-Moonshine Mountain, and another on East Caroga Lake. The Fish Creek Pond and Eaton Lake camps are to be enlarged to meet the increasing demand among tourists and hikers. A section of model trail will be built, to serve as a standard for future trail enlargements.

Child Nature Program

The Kansas State Teachers' College, among other schools, is using Nature to help broaden the children's interest, and has outlined for practice teaching a Nature schedule which will be followed this spring. The basic reason for such a program is laid down by the college as follows: "School work without real interest is ineffective and even harmful. Interest comes from instincts

and experiences. Nature is one of the best sources of both". Nature work is graded from mere requirements of observation among the youngsters to demand on creative imagination and scientific knowledge from the eighth-graders. The American Nature Association is heartily in accord with such programs, and hopes that other schools will adopt similar ones.

To Study Snakes

Dr. Raymond L. Ditmars, curator of reptiles at the Bronx Zoo, left recently for Tela, Honduras, to make a six weeks' study of the fer-de-lance, the most deadly snake in the Western Hemisphere, the howling monkey and the caiman, a species of alligator. He hopes to bring back some new animals for the Zoo. He will be assisted during his stay by Douglas D. H. March, at present overseer of the Tela observation station, which is under the direction of Harvard University and the United Fruit Company.

Oregon Dam Projects

Certain sections of Oregon, principally Jackson County, have organized through their Game Protective Associations to prevent hydro-electric development along the Rogue River, famous steelhead trout stream, and to assure continuance of the great yearly runs of steelhead, silversides, and chinook salmon. The Rogue River has its source in the Cascade Mountains in Crater Lake National Park, and is a principal watershed.

Oregon Bird Refuge

A great migratory bird refuge is being constructed in Oregon on the Owyhee River through the erection of a dam which will create a lake 56 miles long and 200 feet deep. The project, which will result in ample food and protection for great numbers of birds on their bi-yearly journeys, will cost $6,000,000 and take five years to complete.

Pole Traps Condemned

The practice of setting steel traps on poles to catch predatory birds has been condemned strongly by Dr. Gilbert Pearson, President of the National Association of Audubon Societies, who has lent his support to the New Jersey bill to make it illegal. "In many cases bluebirds, robins, and mockingbirds, as well as the non-destructive species of hawk and owl, are destroyed—in fact, any bird who lights on a pole is endangered," he said.

For Garden Lovers

To the amateur gardener who grows flowers for the flowers themselves, *The Garden Lover* by Liberty Hyde Bailey will appeal. It is not a garden manual on what to plant and how to plant it, but, rather, is it a group of delightful and yet practical essays on gardens and their correlative activities such as garden clubs, shows, standardization, collections. One of the charms of this little volume is that it does not set out on any preconceived plan of development of a theme but hops joyously here and there among the delights of gardening. Its author, of course, requires no introduction to those who are garden or botanically-minded. The Macmillan Company are the publishers and the book is listed at $1.50.

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AFTER a day of trampin' and fishin', when Old Sol has slipped out o' the picture and the cool evenin' breeze rustles through the oaks—Oh, man! what a pleasure to sit and rest and smoke and talk! That's the biggest kick o' the day!

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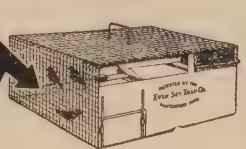

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It has been given to few to know as many wild animals as intimately as have the Finleys. These experiences and friendships have been told in several publications, notably Nature Magazine, but now, happily, they are available between two covers in a volume bearing the title *Wild Animal Pets*. Charles Scribner's Sons have given to this combined work of William Lovell Finley and his wife, Irene Finley, a fine printing, and there has been no stinting in reproducing many of the outstanding illustrations for which Mr. Finley is specially noted. In a foreword the authors give us thought in the following paragraph:

"The eternal problems of life relating to folks of the field and forest are not far different from those to be solved among the various races of man. They require patient study by trained and sympathetic experts. Perhaps adjustments may be properly made so that nearly all the children of the wild can fit into a scheme of mutual welfare. The infinite forces that steered the evolution of the world and produced man evolved many other forms of life—that once gone can never be born again. When we assume the stewardship, must we not accept the responsibility of applying those higher principles of justice and humane treatment?"

This is an excellent thought to stow in the back of the mind as one reads the fascinating story of Mr. and Mrs. Bear; of Dinty, the pet porcupine; of Don Q., the intrepid California quail who grew up with men and women; of the curious rubber-nosed snookum bears; of busy Billy, the badger, and playful Tom and Bob, the youthful bobcats. The stories of these and the many other wild pets that have lived with the Finleys on the beautiful Wilamette, are told with a charm that befits the subjects. They are deftly written to appeal to every member of the family; to be read and reread. They are stories of unique, amusing and often thrilling experiences. They stand by themselves among tales of wild life and the three dollars that are asked for this book can be spent with the assurance that it is an investment in the worthwhile. R.W.W.

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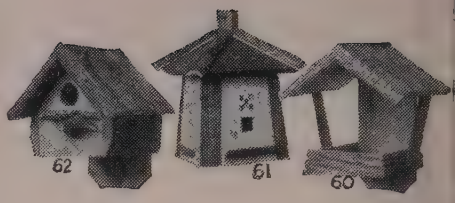

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Cornell Leaflets

Both the November, 1927, and January, 1928, Rural School Leaflets of Cornell University, prepared and supervised by Dr. E. Laurence Palmer, are notable additions to a notable group of Nature publications. The titles in this case are respectively *Fungi* and *Rocks and Minerals*. Both of these fill an immedate need and fill it admirably. Whenever we receive a new leaflet in this group we confess to one regret, and that is that the means are not available to make these publications in sufficient quantity to be at the command of educators everywhere. There will be, in the case of the two here mentioned, a few available for distribution outside of New York. Requests should be addressed to Dr. E. Laurence Palmer, Department of Rural Education, Cornell University, Ithaca, New York.

Our Contemporaries

Of outstanding interest in connection with the history of our mountain sheep is the leading article in the February issue of the *Journal of Mammalogy*. This article is by George Bird Grinnell and presents some facts,—seen and heard,—about the former eastern range of these mammals. Not unrelated, when considered from the point of view of vanishment, is Theodore H. Sheffer's article on the precarious state of the seal and sea-lion on our northwest coast. To the camera-hunting naturalist the notes that William P. Harris, Jr., and Harold DuCharme present on set camera work with beavers in northern Michigan is of particular interest. Other mammal articles in this issue are of equal value.

The March issue of *Scientific Monthly* has as its leading article an extremely helpful exposition with the title "Building a Museum to Human Specifications," by Dr. F. C. Brown. Another valuable article of more than purely scientific significance is by Professor Elliot R. Downing and entitled "The Elements and Safeguards of Scientific Thinking." There is also a fine biography of John Lining, and Early American Scientist, by Franklin C. Bing, among the other titles in this issue.

The *Mountain Magazine* for January is attractively illustrated and of interest to the climber of heights. A plea is made for the creation of the Great Smoky Mountains National Park through the discussion of hiking trail programs for this wonderful area.

Hobbies for March is largely devoted to a discussion of the Nature study work at the Allegany School of Nature History by William P. Alexander. This interesting little publication, in case you don't know, is published by and for the members of the Buffalo Society of Natural Sciences.

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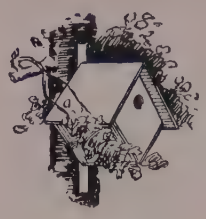

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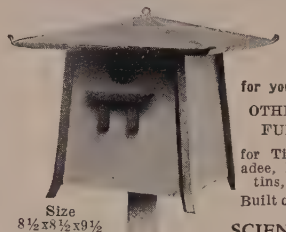

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Dates for the coming season should be arranged as soon as possible by addressing

EXTENSION DEPARTMENT
AMERICAN NATURE ASSOCIATION
15 Boudinot Street, Princeton, New Jersey

A few dates for Mr. Finley's lectures during March and April, 1928, are still available

Questions and Answers

The American Nature Association will be glad to answer each month such questions as its members ask about Nature

QUESTION: *Will you please tell me the name of the moth which makes the so-called Mexican jumping bean jump? Also the name of the bean?—W. N.*

ANSWER: These beans are usually the seeds of a Mexican species of *Croton* (one of the Euphorbiaceae), in which is a larva of a small moth, *Carpocapsa saltitans*. This insect belongs to the same genus as our common codling moth, which is so destructive to apples. The specific name *saltitans* means "jumping".

* * *

QUESTION: *Can you tell me the common and scientific names of that plant known in Missouri as "cockle-bur"?—J. M. M.*

ANSWER: The cockle-bur belongs to the genus *Xanthium* and there are about three species that may be found in your region. They differ chiefly in the form of the leaves. They are all plants of wide distribution, thanks to the spiny burs that are so well designed to be carried by animals.

* * *

QUESTION: *Will you kindly give me some information concerning the partridge berry? —C. C. W.*

ANSWER: The partridge vine or twin berry, known as *Mitchella repens* (Madder Family), is widespread over the eastern states. The white flowers grow in pairs at the end of branches and if both are fertilized they together form one of the berry-like drupes. The flowers of this species grow in two forms like those of the bluets. On one plant all the flowers have the styles low in the tube, and the stamens protrude; on another plant the styles protrude, and the stamens are concealed. This arrangement aids insects in carrying the pollen from one plant to another, thus insuring cross-fertilization, which is beneficial to the species.

* * *

QUESTION: *One of the members of our class claims that he cut open a snake and found in its stomach a fish seven inches long. How could the snake have captured the fish?—E. D.*

ANSWER: Our water snakes are expert fishermen, and a good sized one would have little difficulty in capturing a seven-inch fish. Snakes are often seen crawling slowly along on the bottom of a stream searching for fish. In a study of the food of the common water snake, conducted by the State Zoologist of Pennsylvania a number of years ago, it was found that fish constituted about 30% of the catch.

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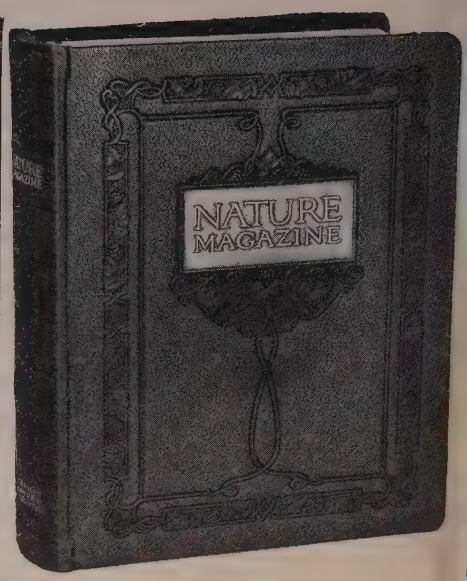

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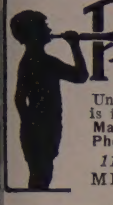

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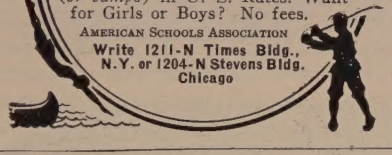

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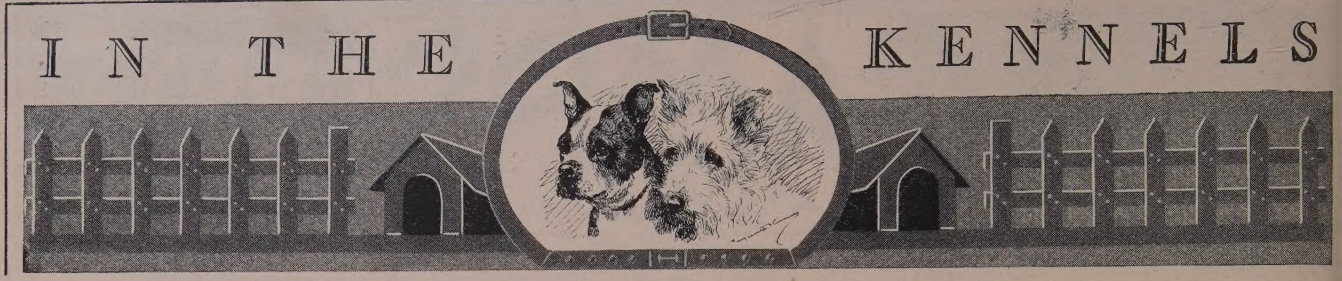

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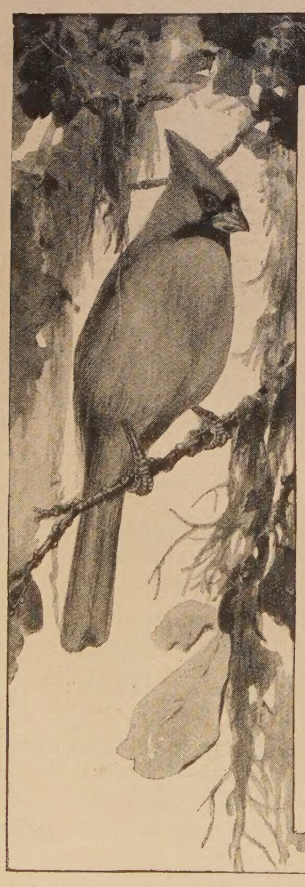

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AMERICAN NATURE ASSOCIATION *WASHINGTON, D. C.*

ANNUAL DUES	
United States	$3.00 a year
Canada	$3.25 a year
Abroad	$4.00 a year

....., 1928

Secretary, AMERICAN NATURE ASSOCIATION,
1214 16th St., Washington, D. C.

I nominate for subscribing membership in the Association and to receive NATURE MAGAZINE:

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Address.....

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90% of the annual dues is designated for subscription to the magazine

"THE THINKER" —By Kessler

WE can not permanently abuse our forests with impunity. The soil is the ultimate source of all our wealth and of life itself. One-fourth of our American soil is best suited for forests. Much of this land is already idle. More of it is being made idle by destructive logging and fire. Yet we can not safely permit our forest land to lie fallow and useless any more than we can permit our farms and factories to lie idle.—CALVIN COOLIDGE.

OUR FORESTS IN THE YEAR 2000

President Sounds a Timely Warning in His Forest Week Proclamation

IN HIS American Forest Week proclamation President Coolidge states the forestry situation squarely when he says "We can not permanently abuse our forests". As he sets forth in the phrase above, soil is the source of all wealth. After pointing out the need of fire prevention the President adds: "We already have made a beginning in forest renewal; but the task is stupendous, and we should permit no satisfaction over what has been done to blind us to the magnitude of what remains to be done".

This warning is well pictured in the cartoon "While the Watchman Sleeps" by James T. Shaffer of Lancaster, N. Y. This cartoon was one of the prize winners in the National Contest conducted by the American Tree Association.

The American Forest Week proclamation comes just as experts announce the population of the United States is increasing at the rate of a million a year. It is high time that we all become "Thinkers" on this important economic subject. Such an increase means a continually increasing call for wood. Such an increase in population means a population of about 150,000,000 in 1953 and approximately 200,000,000 in the year 2003. There are many children living today who will write that date.

There will certainly be no more land than there is right now. The thing to do, as Charles Lathrop Pack, president of the American Tree Association, points out, is to put the millions of acres of idle land we have to work growing trees. Any such increase in population alone will bring a demand upon our wood resources that can not be supplied if all our forests were under the best management. Productive forests are rapidly decreasing. Waste areas are increasing. In 1950 we may have an area of idle land larger than New York, Pennsylvania, New Jersey, Delaware, Maryland, Virginia and all the New England States.

"WHILE THE WATCHMAN SLEEPS"—By James T. Shaffer of Lancaster, N. Y. One of the prize winning cartoons in the National Contest conducted by the American Tree Association.

WHILE THE WATCHMAN SLEEPS

But we are waking up little by little and states like New York, Pennsylvania and Massachusetts are making it possible, through state nurseries, to provide seedlings to the citizen.

The American people are becoming forestry-minded and are thinking about the forestry problem. The coming generation is learning about it too for the American Tree Association has just finished sending 2,000,000 copies of its Forestry Primer to the schools of the country. Indeed we cannot abuse our forest wealth forever. We must grow trees for a growing people.

Holland's Finest Bulbs at Extraordinary Savings!

THE great Holland bulb growers are ready NOW to make important price concessions for immediate orders. Add your order to our own large import orders and we can get for you not only the advantage of bed rock prices for highest quality (prices far below those that will obtain next Fall) but we can have your orders packed for you, in Holland, saving you extra packing cost, reducing freight, handling and import charges to a minimum and guarantee to you the pick of the new crop,—**the biggest and finest bulbs grown in Holland.**

No Deposit Necessary **Order Now** *Pay on Arrival about Sept. 30*

3 Peerless Darwins

Prince of the Netherlands, Glowing cerise-rose, per 100 $6.00
Massenet, Apple blossom pink, per 100 $8.00
Wally Moes, Heliotrope-violet, per 100 $6.00

12	bulbs each, 3 varieties, 36 in all	$2.50
25	bulbs each, 3 varieties, 75 in all	5.00
50	bulbs each, 3 varieties, 150 in all	9.50
100	bulbs each, 3 varieties, 300 in all	18.00

Here are the Bulbs and here are the Prices

Eight glorious collections, each a wonderful value—if you order NOW!

	Per 100
100 **Single Early Tulips** in 10 named varieties. Bloom in April and early May	$ 5.00
100 **Double Early Tulips** in 10 named varieties. Bloom in April and early May	5.50
100 **Darwin Tulips** in 10 named varieties. Immense flowers on stems 2½ ft. tall in May and June	3.50
100 **Cottage Tulips** in 10 named varieties. The tulips of grandmother's garden, improved. May and June	4.00
100 **Breeder or Art Tulips** in 10 named varieties. In form like Darwins, wonderful shades of Bronze, Buff, Orange, etc. May and June	6.00
100 **Bedding Hyacinths** in 4 colors	12.00
100 **Named Hyacinths,** 2nd size, 4 varieties	18.00
100 **Crocus** in 4 named varieties. 1st size bulbs	3.00

Heralds of Spring!

200 of these Lovely Spring Beauties —25 each of the following 8 named varieties for only $6.00

Snowdrops—Glory of the Snow (blue)—Heavenly Blue Grape Hyacinths—Blue Squills (Scilla Sibirica)—Blue Bells (Scilla Campanulata)—White Blue Bells—Wood Hyacinths (Scilla Nutans)—Winter Aconites.

CASH DISCOUNT OF 5% *if you send cash with order*

Caution

These prices good to July 1st—no later.

Schling's "Special" Border Collection

(As pictured above from left to right)

Stately Darwins and wonderful Breeder or Art Tulips—a glorious symphony of color.

	Doz.	100	1,000
Jaune d'Oeuf. (Breeder) A lovely golden sunrise color with tints of apricot on outside of petals. Immense size.	85¢	$6.50	$60.00
Rev. H. Ewbank. (Darwin) A fine clear lavender color. Very large flower of lovely shape	65¢	4.00	38.00
Mr. Farncombe Sanders. (Darwin) A clear luminous scarlet. Extremely large and most attractive of all Darwins	50¢	3.50	33.00
Baronne de la Tonnaye. (Darwin) Beautiful rose-pink, shaded blush-pink at edges. Flower of great size	50¢	3.50	33.00

VERY SPECIAL Collection Prices

1 doz. each of the above 4 varieties (48 bulbs)	$ 2.25
25 each of the above 4 varieties (100 bulbs)	5.50
100 each of the above 4 varieties (400 bulbs)	16.50
1,000 each of the above 4 varieties (4000 bulbs)	155.00

100 Darwin Tulips $2.50 *A Most Remarkable Offer*

Choicest, first size bulbs, sure to bloom. Schling's Special Mixture made up especially for us from ten of the finest named varieties—not at all the ordinary field-grown mixture usually sold. *A $6.00 value for only $2.50.*

3 Rare Cottage Tulips

for the connoisseur

Nectar, Fiery crimson, reflexed, per 100 $12.00
Idyll, Rose with salmon, per 100 $6.00
Argo, Golden bronze, per 100 $12.00

12	bulbs each, 3 varieties, 36 in all	$4.00
25	bulbs each, 3 varieties, 75 in all	7.50
50	bulbs each, 3 varieties, 150 in all	14.50
100	bulbs each, 3 varieties, 300 in all	28.00

Daffodils and Narcissi

for Naturalizing and Lawn Planting

Our Old Dominion Collection in choicest mixture of airy and medium Trumpets, short cupped and lovely Poet's varieties. All first quality bulbs grown in Virginia where their culture has flourished since Colonial days. These bulbs, being native, are fully acclimatized and none better can be grown anywhere. The supply will not equal the demand. Order at once.

100 Bulbs $7.50
1000 Bulbs 70.00

3 Magnificent Daffodils

Lucifer, Ivory white, orange cup, per 100 . . . . . $12.00
King Alfred, Golden trumpet, fringed, per 100 . . . . $20.00
Giant, Primrose, bright yellow trumpet, per 100 . . . . $20.00

12 bulbs each, 3 var. 36 in all	$ 6.50
25 bulbs each, 3 var. 75 in all	13.00
50 bulbs each, 3 var. 150 in all	25.00
100 bulbs each, 3 var. 300 in all	46.00

MAX SCHLING SEEDSMEN, INC.

Schling's Bulbs

618 Madison Ave., North, New York City

Gentlemen:—Please enter my order for bulbs checked on enclosed list for which I agree to pay at these special import prices when order arrives about September 30, 1928.

☐ I am deducting 5% cash discount and enclose full payment in advance.
☐ Please send me your special "Import List" of Bulbs.

Name.....
Address.....

N.B. *Send for our Import Bulb List—many other opportunities, equally alluring!*